

PUBLIC WORKS

Oct.
1952

CITY, COUNTY AND STATE

How Florida Improves
Substandard Roads

Materials Situation for
Water and Sewage Systems

An Incinerator to
Destroy Harbor Wastes

Street Patching Problems
Solved by Portable Plant

Machines Do the Work
Faster and Cheaper

Industrial Waste Problems
and the Community

Columbia River Highway
Construction Problems



Kerwin L. Mick is Chief Engineer and Superintendent of the Minneapolis-St. Paul Sanitary District. More data on page 33.

New!

Tandem
Rollers

with 22 Great Features

HUBER

8-12 TON • 10-14 TON



Here's a new HUBER Tandem Roller that offers new standards of performance in terms of speed, dependability, smooth operation and long life.

Make up a check list of every feature you'd like to see in a tandem roller—and see for yourself how HUBER has anticipated your needs. More than a score of major and minor refinements are incorporated in its design and construction.

Such features as permanent bearing alignment in the kingpin and swivel pin assemblies, the wrap-around frame that gives you a new concept of rigidity, and HUBER's perfected version of fluid coupling are among the improvements that will catch your interest.

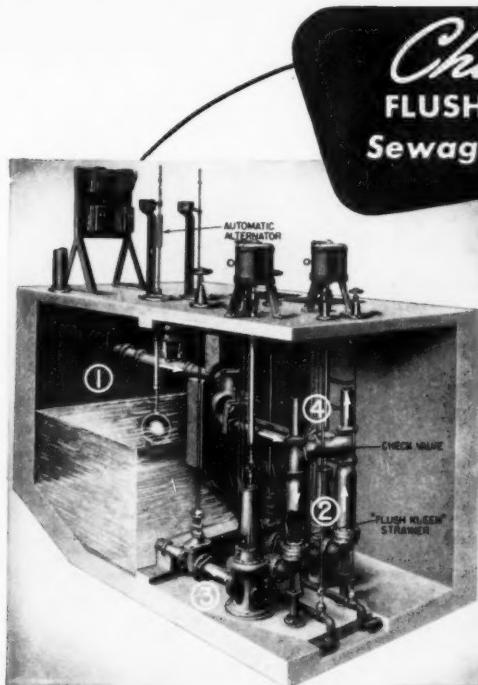
The best way to get the whole story is to see one of the new HUBER tandems in action. Second best is to write for a copy of the new HUBER TANDEM ROLLER BULLETIN, No. T-152. Send for your copy today, or see your nearest HUBER Distributor.



This 16-page bulletin, T-152, tells the story of the new HUBER Tandem Rollers in pictures and descriptive copy. Ask for your copy—address requests to Huber Manufacturing Co., Marion, Ohio.

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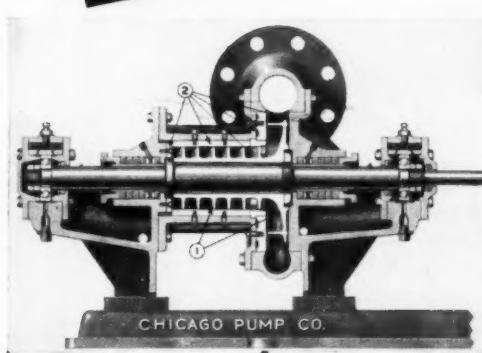
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Over
12,000
In
Service

Flush-Kleens are absolutely clog proof. Here are the reasons why: Flush-Kleen pumps automatically backwash the strainers, keeping solids from basin and pumps, with the impellers handling water only—this is accomplished as follows:

FILLING WET WELL . . . 1. Sewage flows through inlet pipe. 2. Coarse matter is retained on strainer. 3. Strained sewage flows through idle pump to wet well.

PUMPING . . . 3. Strained sewage is pumped from wet well. 2. Coarse matter is backwashed from strainer. 4. Special check valve closes; sewage and coarse matter are pumped to sewers.



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Sludge Pumps

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Than
8,000
In Use

Scru-Peller Pumps are simple in design, positive in operation and are truly clog-proof—here's why:

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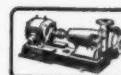
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SEWAGE EQUIPMENT DIVISION

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Complete literature and engineering data will be sent on request.

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The main airline field serving Savannah, Georgia, covers 2,800 acres of which 1,500 must be mowed.

It used to take a month to cut it once-over, mowing with low-speed units. Then the Savannah Airport Commission put two International Super-A tractors to work, and they do the same job in one quick week.

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CONTENTS

OCTOBER 1952

Two Design Features Reduce Sewage Treatment Plant Cost.	By Walter F. Hicks, Jr.	67	
Think of Wells for That Field Water Supply. By W. G. Waterman	69		
The Materials Situation for Water and Sewage Systems.	By G. E. Arnold	70	
Portable Patch Plant Solves Street Patching Problems.	By Arnold Robrecht	72	
Industrial Wastes—A Community Problem. By E. B. Besseliere	74		
How Raleigh Sold the Need for More Water. By J. L. Morrison	77		
How Truck Loaders Solve our Loading and Cleaning Problem.	By L. D. Merrill	79	
Harbor Refuse Disposal in a Large Port. By M. E. Sylvester	80		
A Super-Highway Amendment to the Oregon Trail. By Guy B. Arthur	82		
Treatment Process Completely Eliminates Cyanide Content.	By C. R. Lose	84	
Effects of Filter Loadings and Recirculation Rates	86		
Machines Do the Work Faster and Cheaper	88		
A Better Method of Replacing Services. By Glenn D. Bowen	89		
Siltation of Lake Springfield and Its Control	102		
Stump Splitter is Mounted on Tractor	102		
Milwaukee Considers Composting Garbage. By John Hubel	104		
Effect of Enzymes on Model Septic Tank Operation	112		
Program for Eliminating Cross-Connections	126		
Safety Training Procedures for Foremen	127		
Cement Treated Base Construction in California	134		
Early Release from Service of Reserve Officers	143		
Beachcomber Truck Cleans Beach	145		
● PUBLIC WORKS DIGESTS			
The Sewerage and Refuse Digest	115		
The Highway and Airport Digest	123		
The Water Works Digest	129		
● DEPARTMENTS AND SECTIONS			
The Editor's Page	7	Leaders in Public Works	32
Washington News	16	The Engineers' Library	40
Letters to The Editor	20	APWA News Letter	91
Books in Brief	22	New Public Works Equipment	139
Worth Telling. By Arthur K. Akers	146		

The 1952 volume of Public Works will be available on microfilm through University Microfilm, 313 N. First St., Ann Arbor, Mich.

THE ENGINEERING AUTHORITY
IN THE CITY-COUNTY-STATE FIELD

facts about Rubber Roads

The most promising new development in highway construction in the past few years has been the use of natural rubber powder in asphalt road surfacing. All evidence to date indicates that the addition of relatively small amounts of natural rubber powder to the top surface of an asphalt highway will make the road last longer with less repair, thus stretching the highway dollar. Such rubber-asphalt roads have now been in use abroad for 15 years, and show that elasticity has been added to the pavement, susceptibility to temperature variation has been reduced, the pavement is less brittle at low temperatures, and the effect of shock and vibration on the pavement has been reduced. All this adds up to less maintenance costs.

During the past 15 years, test roads of natural rubber powder in asphalt have been laid in the Netherlands, France, Denmark, Sweden, Switzerland, England, Belgium, Malaya, Ceylon, Indonesia, Africa and Australia, as well as in Canada and in 17 states and the District of Columbia in the United States. The Dutch road, the oldest, has stood up under 15 years of heavy traffic with no maintenance. Massachusetts has already laid more than 300 miles of rubber-asphalt pavements of all types. The City of Baltimore, after a two-year test, has recently ordered the first routine application of rubber-asphalt paving on a city street.

RUBBER ROAD RESEARCH LAB



Highway engineers in the U. S. and Canada have been aided in making tests of rubber-asphalt pavements by the new and completely equipped research laboratory of the Natural Rubber Bureau in Rosslyn, Virginia. Under the direction of Harry K. Fisher, this laboratory is carrying on extensive research in the use of rubber in asphaltic and tar materials. Its findings are available to all highway engineers, and its staff is available for consultation at all times on

rubber road problems. It uses standard tests as approved by the American Society of Testing Materials and the American Association of State Highway Officials. Visitors are welcome to inspect the laboratory and its facilities.

FREE BOOKLET

Those interested in learning more about rubber roads should write to the Natural Rubber Bureau for a copy of the 52-page booklet — "Stretching Highway Dollars With Rubber Roads". This booklet describes in detail the various test roads laid through 1951 in the U. S. and Canada, and gives general background and technical information about rubber in asphalt pavement. A copy of the booklet will be sent free on request.



NEW FILM

The visual story of rubber roads has been ably filmed by United World for the Natural Rubber Bureau in a 30-minute, 16 mm. sound film just released. This film records the results of various test rubber roads to date, shows the work going on at the Natural Rubber Bureau's Research Laboratory, and gives a complete summary of rubber road developments. It can be obtained at no cost for showing to groups of highway engineers and others interested in stretching highway dollars.



Natural Rubber Bureau

1631 K STREET, N. W., WASHINGTON 6, D. C.

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Get full details of this month's new products . . . mail your Readers' Service card today.

THE EDITOR'S POINT OF VIEW



Furthering Progress in the Public Works Field

RECONIZING the valuable contributions which the American Public Works Association has made and is making in the field of public works, and appreciating the desirability of a wider distribution of APWA services, Public Works Magazine, beginning with this issue, has agreed to contribute certain of its facilities to the Association. Its purposes in doing this are to provide a larger audience for APWA studies and reports, to assist in the collection and dissemination of valuable public works data, and to supply a means which will aid APWA to increase the scope of its usefulness. APWA news will be published in each issue of Public Works (it appears this month on page 91); and, in addition, a Washington News Letter, furnished through the facilities of APWA, will be published. (In this issue, this appears on page 16).

There are today pressing and serious needs in the public works field for newer and better methods of street and highway construction and maintenance, for better methods of waste disposal, both solid and liquid; for municipal and industrial water supplies of acceptable quality; for civil defense; and for the maximum use of modern equipment and methods in design, construction, operation and maintenance. These are fields with which both the American Public Works Association and Public Works Magazine have long been concerned, and matters in which both have made notable contributions. Working together, with each retaining its full independence, identity, initiative and freedom of action, progress should be more rapid than in the past.

We have long appreciated the fine work that the APWA has done and we are glad to cooperate with it to increase the effectiveness of its program.

One Reason Why It Is Hard to Answer Some Questions

THIS office gets quite a good many requests for advice and help on matters pertaining to the military—the chances for a commission, the likelihood of a reserve officer being placed on an active status, the chance for deferment of active duty to finish a special job, and many others of a like nature.

If we do not always come up with a prompt and complete answer, we would like our readers to know that, in New York City, there are 21 telephone listings for the Department of the Army, 12 for the First Army, and 61 for the Organized Reserve Corps. If we assume only 5 men at the other end of each of these telephones, there are 470 different folks to contact. Some are away; some don't know. All in all, we are not wholly sure that the word "organized" above really applies. It could be a misnomer. Anyway, have patience with us when you hand us a problem of this sort to unravel; and hope and charity, too. Faith, we don't know about.

Something to Think About When Writing an Engineering Report

ONE of the jobs of the editor is to read quite a few engineering reports. It seems to us that many of those referring to specific water, sewerage, refuse and, to a lesser extent, highway and street jobs, represent poor salesmanship. It looks like they are meant to suit the state sanitary engineering staff which often likes to have a complete history, presented in a lofty and philosophical form, to file away for maybe some future use.

In most cases a consulting engineer is brought in for one purpose only—to get the job done. The local folks are generally not competent to judge details of engineering; it is up to the engineer to weigh the pros and cons and make the decisions. His report, then, should be direct and to the point, and prepared with the single purpose of getting the plans approved, the money raised and the work completed. Anything that detracts attention from this end is likely to slow down the procedure.

In some cases, there are alternate possibilities—a well supply versus a filter plant. These should be investigated fully. The recommendation of the engineer then should be incorporated in the report. If it is desired to go into detail, these details are best made available as an appendix to a brief report and recommendations.

We have an idea that better salesmanship along this line would reduce the number of excellent reports that end up being filed for "future reference" and would increase the number of working installations.

This is the pipe



Now's the time to mail this month's Readers' Service card.

that's known as the Taxpayers' Friend

To a tax-burdened public the statement that cast iron pipe is the "taxpayers' friend" is more than a mere figure of speech. To most waterworks engineers it is a cold fact. They know that cast iron pipe in water distribution systems has saved, and continues to save, millions of dollars in local taxes.

The useful life of cast iron pipe is known to be 4 to 5 times the average term of a water revenue bond issue. More than 35 American cities have cast iron mains in service that were installed over 100 years ago. A survey sponsored by three waterworks associations shows that 96% of all six-inch and larger cast iron pipe *ever laid* in 25 representative cities, is still in service.

Fortunately for taxpayers, over 95% of the pipe in America's water distribution systems is long-lived cast iron pipe—*the taxpayers' friend.*



This cast iron water main installed in Richmond, Virginia, 120 years ago, is still in service. Over 35 other cities have century-old cast iron mains in service.

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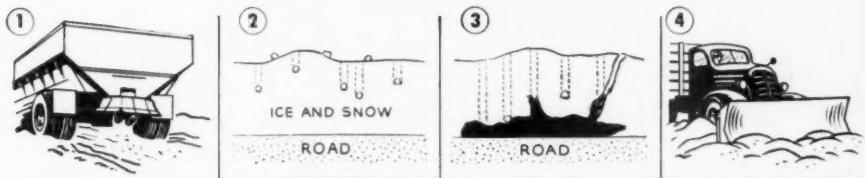
SPEED

One truck of STERLING Auger-Action ROCK SALT will cover 10-15 miles before reloading. One truck with abrasives will cover only 1½ miles before reloading. **THUS SALT IS APPLIED IN 1/10th THE TIME OF ABRASIVES.**

ECONOMY

Because STERLING Auger-Action ROCK SALT is easier to store and handle—because it goes so much further, in much less time—the total cost per mile of using straight rock salt is approximately *half* that of old-fashioned abrasive-chemical combinations.

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STERLING Auger-Action ROCK SALT can be used in any mechanical spreader. Requires no special treatment.

Each STERLING Auger-Action ROCK SALT crystal bores a hole its own size in ice or snow.

When salt crystal reaches pavement, it becomes brine. Brine BREAKS THE BOND between road surface and ice.

Broken ice can be removed with one pass of plow or scraper. Heavy traffic spots clear themselves with passage of vehicles.

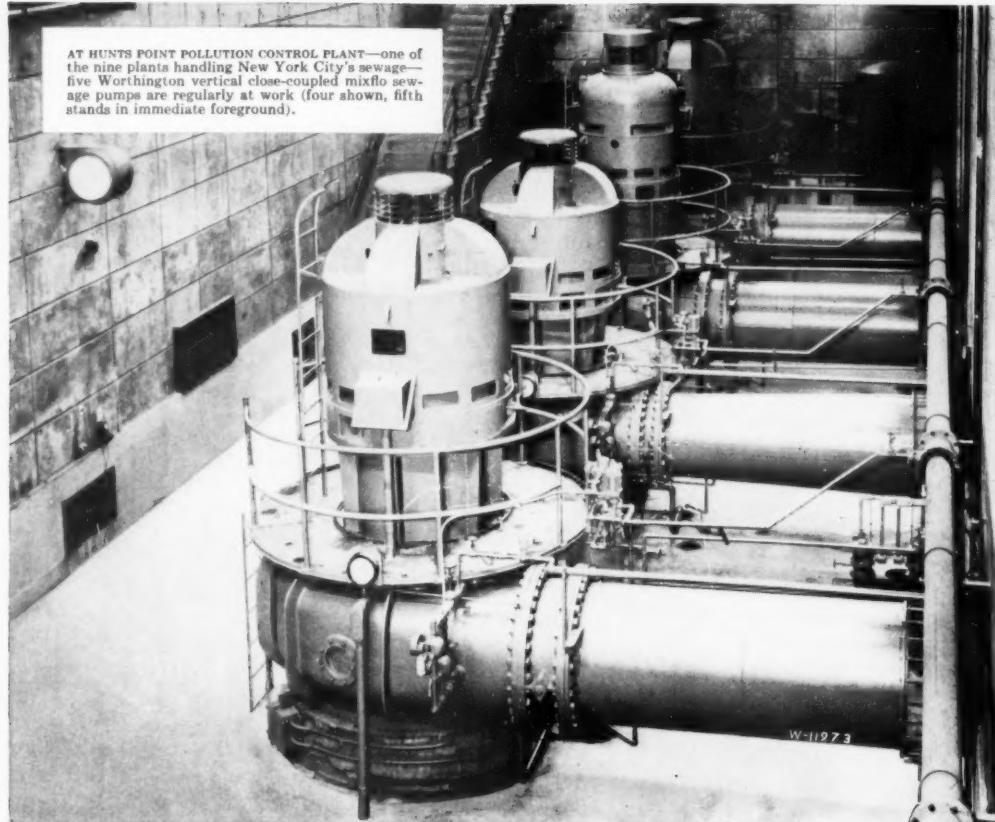
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1689 mgd of New York City's Treated Sewage handled by Worthington pumps

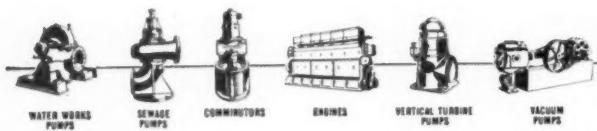
If you want to see Worthington sewage pumps—large and small—at work, you can't go wrong by looking inside six of the nine major disposal plants that serve the City of New York. A total of 1689 mgd installed capacity of Worthington sewage pumps are now in regular use in the world's largest city.

New York's installed capacity of sewage pumps is among the largest in the U. S., so you'd naturally expect the city's public works officials to be familiar

with Worthington performance—performance that years ago gave Worthington its position as world leader in the manufacture of pumping equipment.

Hundreds of smaller municipalities across the country know Worthington, too, not only for sewage pumps but for water-works pumps, comminutors, engines and other public works equipment. *Worthington Corporation, Public Works Division, Harrison, New Jersey.*

W.2.3



All Major Public Works Equipment Under One Responsibility

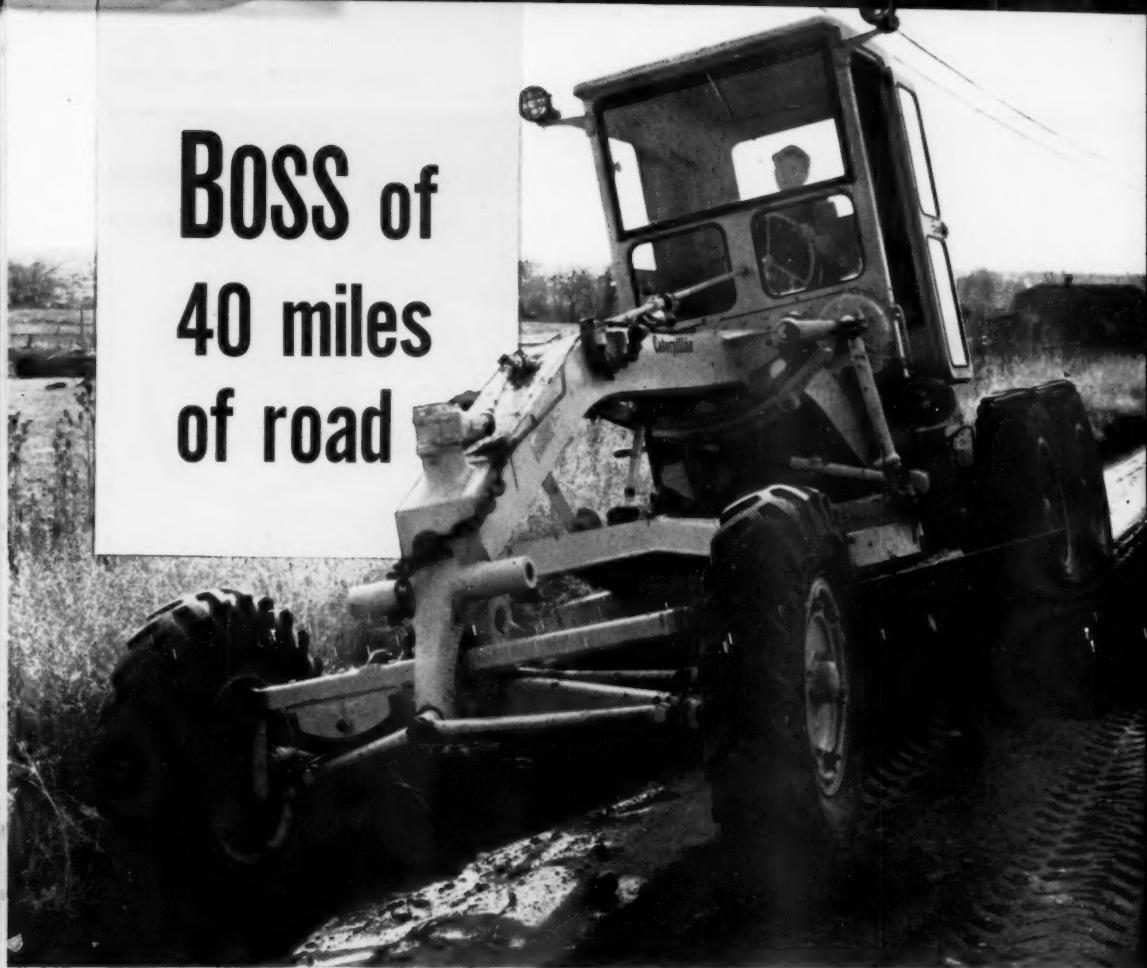
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WORTHINGTON



Public Works Equipment

BOSS of 40 miles of road



This "Caterpillar" No. 212, owned by Arapahoe County, Colorado, does a master job of ditching as well as all other kinds of road maintenance.

Arapahoe County, Colorado, owns two "Caterpillar" No. 212 Motor Graders, each of which maintains and clears snow from about 40 miles of suburban streets and roads.

County Superintendent William L. Munkees says: "I have operated 'Caterpillar' machines for 30 years, and I consider the No. 212 the very best equipment to be had."

Here are some of the features that make this 50-HP unit an all-round maintenance favorite:

1. Every inch of it is "Caterpillar"-designed and built.
2. Weight, horsepower and speed of the No. 212 are perfectly balanced for maximum performance.

3. Tandem drive assures constant power delivery and traction.

4. Mechanical controls provide instant, positive blade action under all conditions.

5. The operator has a full view of the road, the blade and the job.

6. Complete range of blade positions gives the machine top versatility.

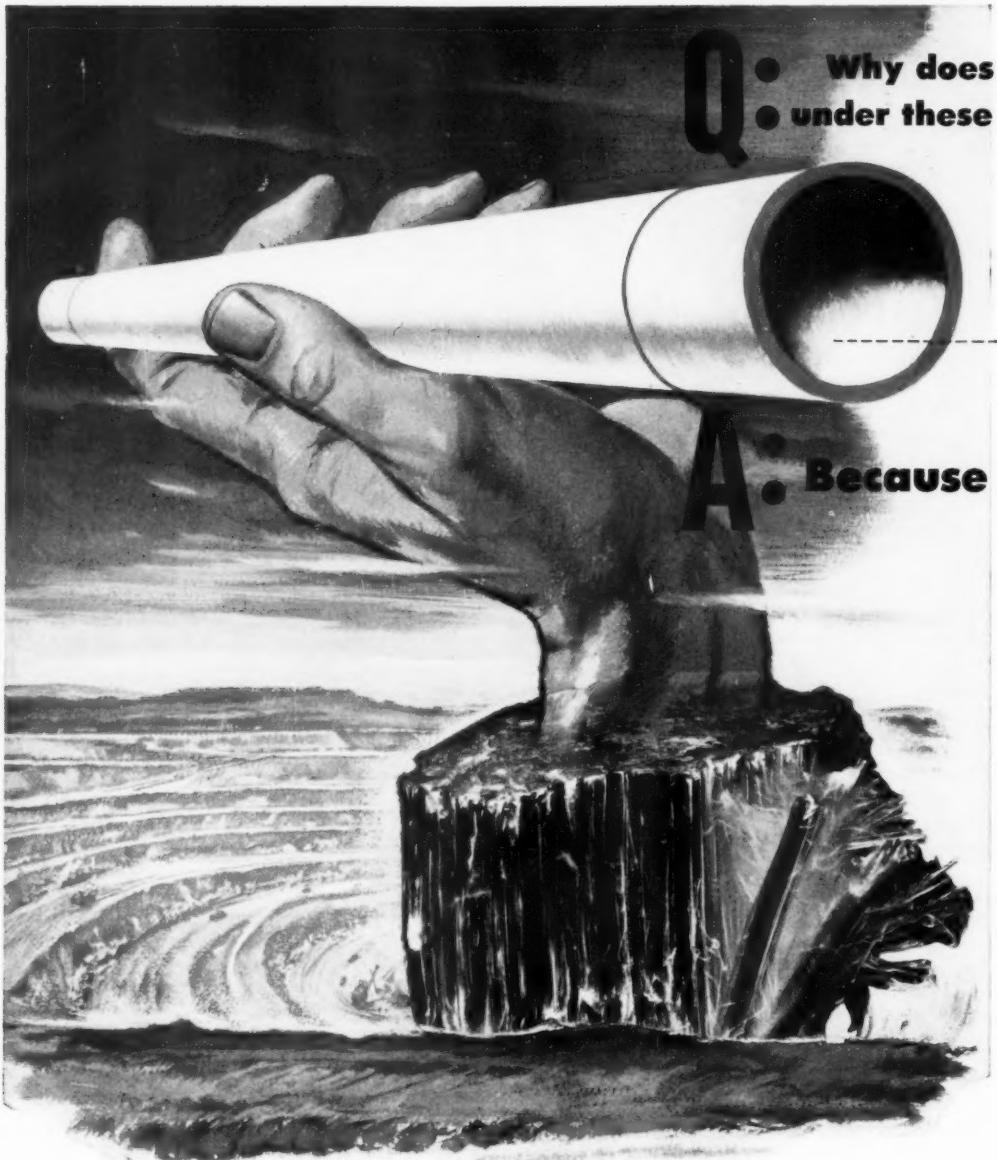
The "Cat" No. 212 is built to handle all types of jobs—ditching, reverse grading, scarifying, bank shaping, snowplowing, oil mixing, maintenance and fine finishing. Get the full facts from your "Caterpillar" Dealer. He can show you outstanding work records, and he stands back of every machine he sells with genuine parts and reliable service.

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TRANSITE PIPE last longer West Virginia city streets?

Transite Pipe was first installed in this West Virginia city in 1935. In addition to heavy street traffic, it has withstood soil conditions so destructive that the pipe previously used had a service life of only two to three years. When the Transite main was recently uncovered to insert a tap into the line, the pipe was found in as good condition as the day it was laid!



it's reinforced with ASBESTOS for lasting strength

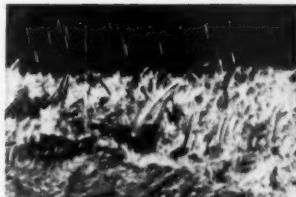
THERE IS GOOD REASON why Transite* Pressure Pipe—shown in the city street above—has already far exceeded engineers' expectations for the service life of pipe used here:

It's reinforced with tough, strong, indestructible fibers of asbestos—the mineral that defies time!

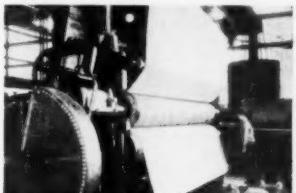
Countless numbers of these remarkably strong asbestos fibers—their tensile strength is comparable to that of steel—are dispersed uniformly throughout every length of Transite Pressure Pipe. This reinforced structure not only contributes to the *initial* strength needed in a pipe designed for use under busy city streets. Equally important, it helps assure the *lasting* strength that enables Transite Pipe to survive continued corrosive attack, year after year . . . to stay strong in service under conditions that are highly adverse to ordinary pipe materials.

This quality of lasting strength is one of many important advantages of a pipe engineered with modern water transportation requirements in mind. Transite's Simplex Couplings reduce water-line leakage losses to a minimum, provide flexibility to help relieve the line of soil stresses and traffic loads. Its light weight makes for easier handling and effects substantial savings during installation. Its smooth interior assures a high coefficient of flow (C=140) and, because Transite can never tuberculate, helps keep pumping costs low through the years.

To find out more about how this modern asbestos-cement pipe can help solve your waterline problems and save you money, write Johns-Manville, Box 60, New York 16, N.Y.



This photomicrograph shows how the tough, strong asbestos fibers are distributed uniformly throughout the structure of the pipe.



On machines like this, the asbestos-cement-silica mixture is "built up" under heavy pressure into a dense, homogeneous pipe structure.



Transite's flexible Simplex Couplings help relieve the line of excessive flexural stresses—an added safeguard against pipe failures.

JOHNS-MANVILLE
JM
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HELLIGE
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Equipment
**USED WITH CONFIDENCE
 ... EVERYWHERE**

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**GUARANTEED
 NON-FADING**

Glass Color Standards
 for pH, Chlorine, and 22 other important Tests.



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**PHOTOELECTRIC
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 TURBIDIMETER**
 for Diverse Water
 and Sewage Tests.



TURBIDIMETER
 The Turbidimeter
 Without Standards
 for Turbidity
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 and Sulfate
 Determinations.



TWIN-KIT for
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GUARANTEED NON-
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Reported as of September 10, 1952

NATIONAL PRODUCTION AUTHORITY PROMISES DECONTROLS

RELAXATION of curbs on construction projects have now been promised by the National Production Authority "before April 1, 1953," in an official policy statement.

Effective April 1, 1953, a new Direction 8 to revised CMP Regulation 6 would permit self-authorization up to the following amounts:

1. For recreational, entertainment and amusement construction per project per quarter: 5 tons of carbon steel (not to include more than 2 tons of structural shapes), 500 pounds of copper and copper-base alloys, and 300 pounds of aluminum. Previously no self-authorization was permitted for this type of construction.

2. For elementary and secondary schools, per project: 50 tons of carbon steel (not to include more than 7 tons of structural); copper, 5,000 pounds; and aluminum 4,000 pounds. The present limits are 5 tons of steel, 1,000 pounds of copper and 2,000 pounds of aluminum per project, per quarter.

3. For highways, per project: 25 tons of carbon steel (not to include more than 12 tons of structural) and the same amounts of copper and aluminum now permitted — 500 pounds of each. The present steel limit is 25 tons, not to include more than 2 tons of structural.

4. All other construction, per project, per quarter: 25 tons of carbon and alloy steel, including structural (not to include more than 2½ tons of alloy and no stainless), 5,000 pounds of copper, and 4,000 pounds of aluminum.

In regard to "all other" construction, NPA noted that it proposed to eliminate the distinction now existing in the regulation between "industrial" and "all other" construction and permit the same self-authorization quantities for both. "All

other" construction will include industrial, commercial, public, hospitals, university, public utility, water and sewage projects and transportation facilities.

At present, all of these types of construction, except industrial, are allowed to self-authorize 5 tons of carbon steel (not to include more than two tons of structural but no wide-flange beams or sections), 1,000 pounds of copper and 2,000 pounds of aluminum, per project, per quarter.

Also effective immediately would be a change in Reg. 6 providing that applications for recreation facilities which are part of a hospital or school project should be filed with the Federal Security Agency, or, in the case of a veterans' hospital, with the Veterans Administration.

Another change effective immediately would include permission to use a DO rating to purchase operating equipment for the operation of schools and hospitals as well as for industrial plants.

NPA stressed that, under terms of the proposed Direction 8, to Reg. 6, which it plans to issue shortly, purchase orders for the new self-certification quantities can be placed at any time, provided that they do not call for delivery before April 1, 1953.

NPA is issuing the order now, although with an April 1, 1953 effective date, so that builders can do the preliminary planning for future construction and place advance orders with suppliers.

FLORIDA TOLL ROAD PROPOSAL

A plan for a \$275 million toll road was presented to the Florida Road Department on August 13. Engineering proposals by Parsons, Brinkerhoff, Hall and McDonald of New York provide for immediate construction of a toll road from a point south of Jacksonville 315 miles along the Atlantic Coast to Miami. (Continued on page 121)



YOU WON'T BE SNOW-BOUND AGAIN!

**...WITH A BARBER-GREENE
Snow Loader**

Big snows paralyze cities and businesses. The Barber-Greene Snow Loader removes snow at a clip of 7-11 yards per minute. A swivel conveyor keeps trucks moving in a continuous production line. Only one traffic lane is required. At a 15 m.p.h. road speed, the B-G Snow Loader moves from one location to another quickly.

Whether your city has a population of 3,000, 300,000 or 3,000,000, it will pay you to investigate. Compared to less efficient methods, the B-G Snow Loader will pay for itself in savings in truck time alone after only 600 hours of operation.

Features of the

B-G Model 544 Snow Loader

- One-Man Operation
- Loads and Trims Long, High-Sided Trucks
- Low Clearance—12' 0"
- Loads Over Cab or with Trucks Alongside
- Hydraulically Controlled Swivel Conveyor
- 15 M.P.H. Road Speed
- Delivers 7-11 Yards per Minute
- Ample Traction and Stability

Other uses for

the B-G Model 544 Snow Loader

After the snow season, the B-G Snow Loader, a year-round machine, handles coal, leaves and other nonabrasives. Also, it can be converted into a Bucket Loader to handle aggregate materials.

283

DON'T DELAY...SNOW WON'T!

Write Your B-G Distributor Today for Complete Information

Barber-Greene

Aurora, Illinois, U.S.A.



Thousands use our Readers' Service card to keep up to date . . . do you?

Salt + Banox*

— the unbeatable team for snow and ice control

Chalk up a victory over Old Man Winter with a real good-will building program.

PREVENT pedestrian and vehicular ice accidents.

SPEED UP traffic movement.

KEEP your community free of wind-borne abrasive dust and dirt.

ELIMINATE motorists' complaints about automobile rusting.

Set a new record for low-cost street maintenance.

ELIMINATE costly removal of abrasives from gutters, catch basins and sewers.

REDUCE labor of deep snow and ice removal by preventing ice bonding.

PROLONG life of publicly owned vehicles by preventing costly corrosion.

PROTECT metal bridges, ramps, garages and other community property.

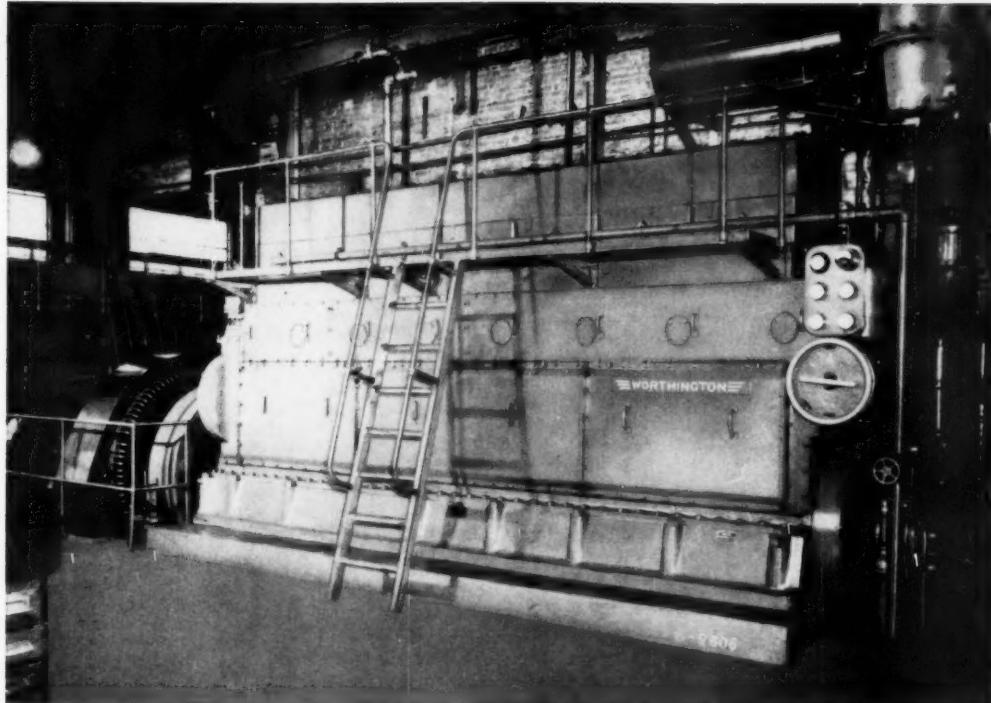
During the past two winters scores of communities have PROVEN that salt plus 1% Banox STOPS salt-slush corrosion.

May we send you full information?

*T.M. Reg. U.S. Pat. Off.



Now's the time to mail this month's Readers' Service card.



WORTHINGTON 1085-KW DIESEL ENGINE, is one of three Worthington engines now serving at Ford City, Pa., municipal power plant. This engine, during first 2 years of operation, logged 16,490 hrs. with average lube oil consumption of 5,400 hp hrs per gallon.

Ford City, Pa.—Another “repeat” customer of Worthington Diesels

Borough officials take pride in power plant's operating economy during 16 years

Sixteen years have passed since the first Worthington Diesel was installed in the municipal power-generation plant at Ford City, Pennsylvania.

The latest installation—made in 1948—is a Worthington 1085-kw Diesel generator set. Other Worthington performers in the plant are the 300-kw unit installed in 1936 and the 462-kw unit installed in 1938.

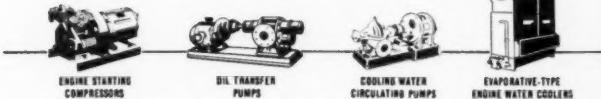
Borough officials and the plant manager—who

pride themselves on operating economy—tell us they now take for granted the dependability of their Worthington engines. Local consumers—some 6,000—have the low consumption of fuel oil and lube oil, as well as low maintenance expense, to thank for their economical rates.

Worthington's complete line of engines can give your municipal installation the most economical power no matter what fuel is used. For more data on modern Worthington engines—gas, Diesel, or dual-fuel—write Worthington Corporation, Engine Division, Buffalo, N. Y.

E.2.4

Worthington-Built Auxiliaries



Economical Continuous Power—Diesel Engines, 150 to 2,100 hp . . . Gas Engines, 190 to 2,100 hp . . . Dual Fuel Engines, 150 to 2,100 hp.

WORTHINGTON



Engines

It's a fact... our handy Readers' Service card is the way to get new catalogs.

The Hydrant that Laughs at Traffic Hazards

KENNEDY SAFETOP



As tough as they come . . .



but when it breaks, it's as clean as a whistle . . . at ground level.



yet, it's back in service in twenty minutes.

The safety breakable section of a KENNEDY Safetop Fire Hydrant will take all the punishment that a standard one-piece hydrant will. But when a couple of tons of flying steel hits it at high speed—and it's more than any hydrant can take—it breaks cleanly and evenly at ground level.

Within twenty minutes of arrival at the scene one man can have it back in service—no excavation—no water—no hoists—no costly replacements. A new breaking ring and a new stem coupling are all that are usually required.



Write for Bulletin No. 105

Where there is no traffic hazard install a KENNEDY Standard Hydrant with one-piece standpipe and stem

- The same minimum friction, maximum water supply design.
- The same positive drainage to protect against freezing.
- The same leak proof construction and ease of inspection . . . and all parts interchangeable with the SAFETOP except the standpipe and stem.

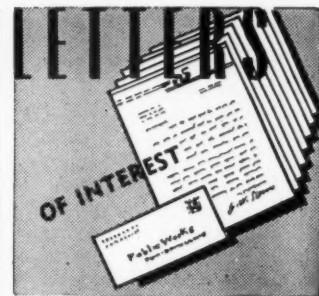
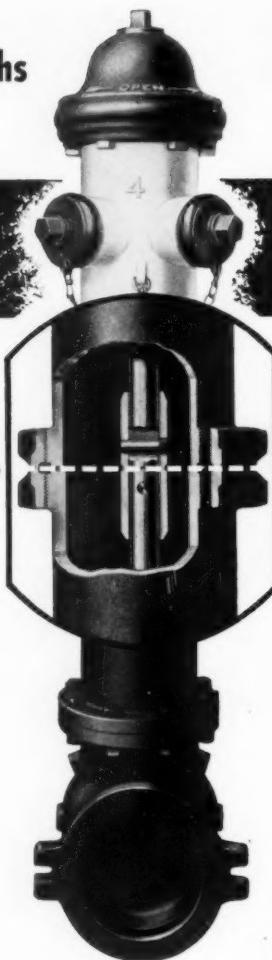
Write for Bulletin No. 109



THE **KENNEDY**
VALVE MFG. CO. • ELMIRA, N.Y.

VALVES • PIPE FITTINGS • FIRE HYDRANTS

Need more facts about advertised products? Mail your Readers' Service card now.



DESIGN OF SMALL DAMS

Some time ago I bought your "Design of Small Dams" but have unfortunately mislaid or lost the copy. Will you please let me know where to buy another copy and the price of the book?

W. L. Lance,
Consulting Engineer
Trucksville, Pa.

ED. NOTE: This booklet was based on a series of articles in Public Works in December, 1935 and Jan., Feb. & March, 1936, primarily. We have no more of these booklets. If any of our readers should have an extra copy, will they communicate with Mr. Lance? Thanks a lot.

INCINERATION AND SANITARY LANDFILL

This bureau is conducting a survey to determine the relative merits of sanitary landfill and incineration for the disposal of municipal refuse. We would appreciate receiving a bibliography of surveys and studies made in this field, along with references to other information that may be helpful. We are particularly anxious to obtain a list of cities using incineration and also a list of those using sanitary landfill. Thanks for any help.

Bernard Hillenbrand,
Deputy Director,
Bureau of Municipal Research,
Syracuse, N. Y.

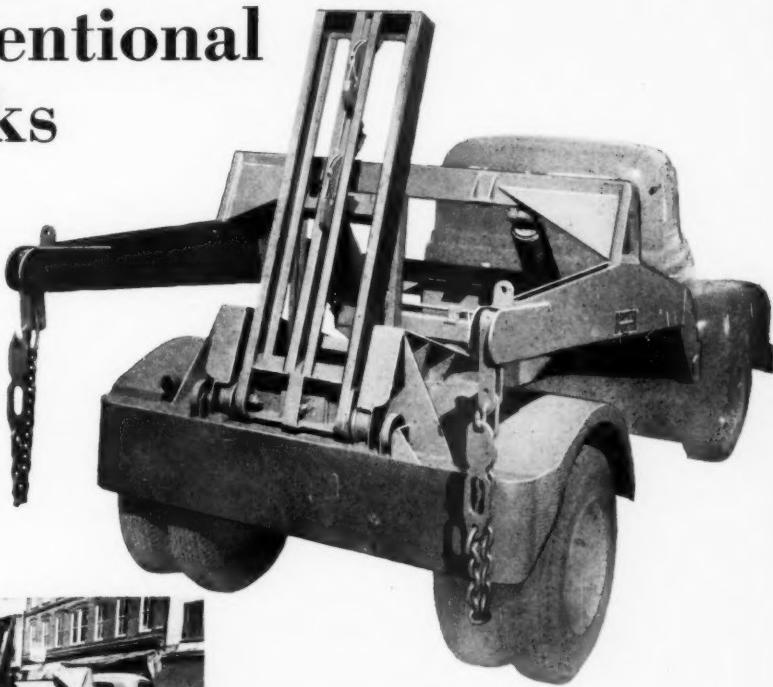
WANTED: A PLANNING DIRECTOR

An important planning position is open in the City of Detroit. It is that of Director of Planning. The salary is \$12,321 to \$12,846, and is accompanied by liberal health, vacation and pension benefits. He will be in charge of a staff of 38 planners, researchers and technicians. Major items coming up include revision of the Zoning Ordinance, prepara-

The DEMPSTER DUMPSTER® Rubbish Collection System

Eliminates 3 to 5 Conventional Trucks

THREE STAGES of quick pick-up, hauling and dumping are shown while Dempster-Dumpster is at work in Norfolk, Va.



One truck-mounted Dempster-Dumpster picks up, hauls and empties, one after another, a multiple number of detachable containers . . . eliminating 3 to 5 conventional trucks and crews. Containers are spotted at hospitals, schools, business establishments, etc. and loaded by the user. Container sizes range up to more than three times the capacity of the average dump truck body. For low cost, efficient and sanitary bulk rubbish collection, your city needs the Dempster-Dumpster System. Manufactured exclusively by Dempster Brothers, Inc.

One Dempster-Dumpster Services All Containers
... All Designs... All Sizes



DEMPSTER BROTHERS

9102 Dempster Bldg.

Knoxville 17, Tenn.

Get full details of this month's new products... mail your Readers' Service card today.



More and more dollars are flowing into public treasuries. Civic activities are expanding into new channels. The increase in the number of public employees provides more numerous opportunities for dishonest acts. However, the proper bonding of these employees for ample amounts is overlooked in many instances.

Able administrators of public affairs, charged with public trusts, are taking advantage of NATIONAL SURETY PUBLIC EMPLOYEES BLANKET BONDS to cover all employees under their supervision. Our agents or representatives will gladly survey YOUR requirements. Act today—delays can be costly.



INVISIBLE ARMOR®

NATIONAL SURETY CORPORATION

4 Albany Street, New York

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tion of redevelopment project plans, revision of the master plan and neighborhood unit planning. The examination will be held October 17. Application should be made to the Detroit Civil Service Commission, 16th Floor, Water Board Bldg., Detroit 26, Mich., by October 10.

Ralph Mueller,
Head Personnel Examiner,
Examination Division,
Detroit Civil Service Comm.

ED. NOTE: In view of the shortness of the time available, we have suggested to Mr. Mueller that the application date be extended, but we have no assurance that this is possible. Therefore, applications should be made immediately.

BOOKS IN BRIEF

HIGHWAY CURVES

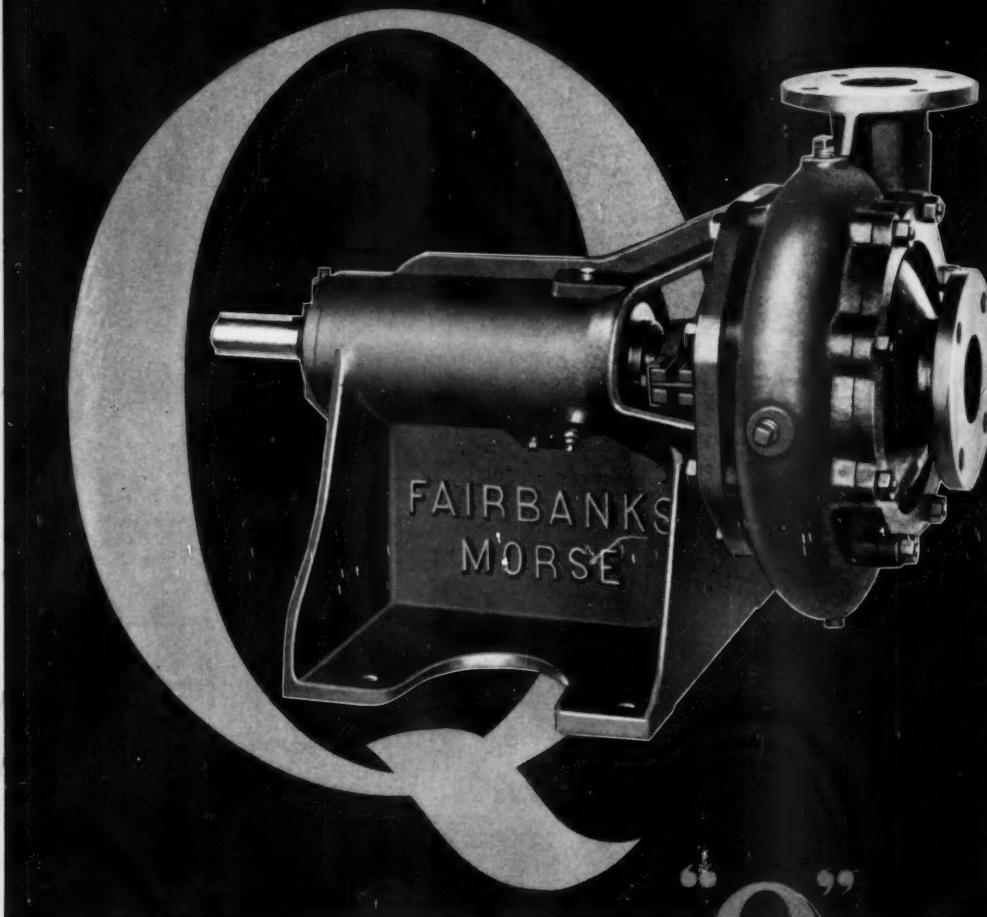
This is the Fourth Edition of that highly useful text "Highway Curves," authored by the late Howard Chapin Ives and by Philip Kissam, professor of Civil Engineering at Princeton. In this new edition, the entire text has been rewritten. Accordingly there are many improvements in presentation of material to accomplish both simplicity and effectiveness. The mathematical tables are exceedingly handy, even to other than highway engineers. Part 1, the text, has 197 pages; Part 2, tables, has 381 pages. John Wiley & Sons, Inc., New York. \$7.

PUBLIC HEALTH ENGINEERING

This is a new book by a top-notch man in the field of public health engineering, a man who has already written other useful and widely read books. There are 26 chapters, covering sanitary engineering in disasters, rural and camp sanitation, swimming pools, refuse, industrial hygiene, disinfection, housing, air sanitation and many other problems of a similar nature. The author is Harold E. Babbitt; the publisher is McGraw-Hill Book Co., 330 West 42nd St., N. Y. 582 pages; 53 illus.; 70 tables; \$8.

TRICKLING FILTERS

This handbook of Trickling Filter Design, 32-pages of information on the design, construction and operation of trickling filters, is available, without charge, from Frank



it's Your

"Q"

Quality . . . that costs no more is yours when you choose Fairbanks-Morse Side Suction Centrifugal Pumps. Extensive engineering laboratories . . . production line methods with precision machining of all parts enable Fairbanks-Morse to offer you a side suction centrifugal with the design, workmanship and performance normally obtained only in highest quality split-case pumps.

Open type, single suction, high efficiency impeller

. . . ball-bearing frame construction for long life and smooth operation . . . one-piece, solid cast frame . . . close-grained smooth cast iron volute . . . are among the many big pump features you'll find in these moderate priced side suction centrifugals.

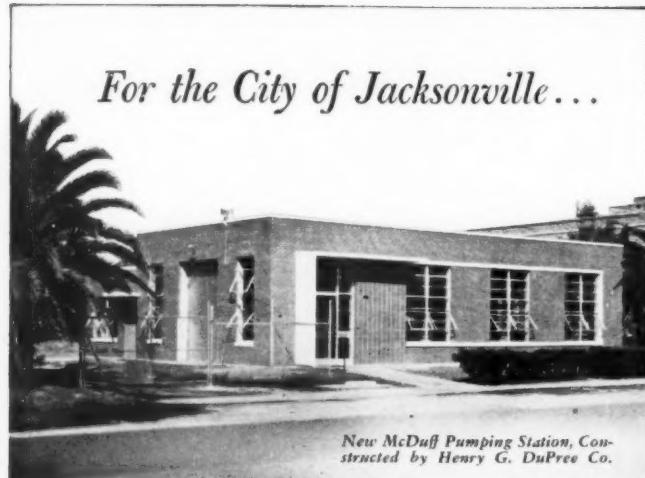
For a "cue" to better pump performance, choose the pumps that spell quality with a capital "Q" . . . Fairbanks-Morse Side Suction Centrifugals. Fairbanks, Morse & Co., 600 S. Michigan, Chicago 5, Ill.



FAIRBANKS-MORSE,

a name worth remembering when you want the best

PUMPS • DIESEL LOCOMOTIVES • ELECTRICAL MACHINERY • SCALES • HOME
WATER SERVICE EQUIPMENT • RAIL CARS • FARM MACHINERY • MAGNETOS



IT'S 100% SIMPLEX

TYPE MO VENTURI METERS

The City of Jacksonville, Florida installed its first Simplex Type MO Venturi Meters back in 1925. Here's what Mr. C. H. Helwick, Superintendent of Jacksonville's Water Department, has to say about those original meters:

"These two meters have required very little attention and have remained dependably accurate through the years. The capacities of the pumping stations . . . have been enlarged beyond the capacities of the meters, and these meters have been removed and reinstalled at new pumping stations for more years of service."

No wonder, then, when consulting engineers Reynolds, Smith & Hills undertook the plans for Jacksonville's \$7,000,000 water works improvement program, that Simplex Type MO Venturi Meters were specified as standard equipment for *all* pumping stations. For full information about MO and other Simplex meters write to Simplex Valve and Meter Company, Department 10, 6750 Upland Street, Philadelphia 42, Pa.



SIMPLEX

VALVE AND METER COMPANY

It's a fact... our handy Readers' Service card is the way to get new catalogs.

H. Milliken, Registered Engineer, Bowerston Shale Co., Bowerston, O. This handbook is based on the series of articles published some time ago by PUBLIC WORKS.

DICTIONARY OF ARCHITECTURE

This is a compact and handy book of 221 pages which is exactly what its name implies—a dictionary of architectural terms. It starts with "Aaron's rod" and ends with "zwinger", which you may be interested to know is a "bailey." Following the dictionary part, there are 31 pages of plates of architectural illustrations of details. By H. H. Saylor. John Wiley & Sons, Inc., New York. \$4.50.

DUPONT'S STORY

This is the autobiography of an American enterprise, known and familiar to all of us. It is a book without an author "just as it is a story without an end." For the DuPont organization is continuing to go forward in this, its 150th anniversary year. All of us expect more miracles to flow from the DuPont research and the DuPont initiative, and it doesn't seem likely that we will be disappointed. In the meantime, this is a hard book to review; it is so interesting, it spoils a complete afternoon. It is distributed by Charles Scribner's Sons, N. Y. No price stated.

CALCIUM CHLORIDE IN CONCRETE

This bibliography presents a complete reference and a source of information relating to the effect of calcium chloride on the properties of portland cement and concrete. The references listed go back to 1885 and include one 1952 publication. Considerable information is given under each listing so that the reader can form a good opinion of the scope and contents of the original article. 62 mimeographed pages. 60 cents. Highway Research Board, 2101 Constitution Ave. NW, Washington 25, D. C.

ELECTRIC MOTOR CONTROLLERS

This is a second edition designed to serve engineers who select controls and the maintenance men whose job it is to keep the machines running. By H. D. James and L. E. Markle. McGraw-Hill Book Co., New York. 418 pages, \$7.



Horsepower, geared to the ground, crowds a heaped load into the bucket, on trench excavation.



Refuse handling requires the sure-footed traction and all-weather operation of TRAXCAVATOR Shovels!

MODERN SANITARY LANDFILLS EFFICIENTLY MANAGED BY TRAXCAVATOR SHOVELS

One machine—one operator handles any city's needs

The sanitary landfill system has solved many communities' problem of refuse disposal. The unsightly, open dumps that fostered disease and offensive odors, are rapidly being replaced with parks, airport facilities, industries, all built on the site of sanitary landfills. Even the largest of communities are able to turn waste lands into disposal areas and then into valuable property with the landfill system.

This method of refuse handling is no more costly than old, inadequate methods—when TRAXCAVATOR Shovels are used!

These modern earthmoving and material handling tools have brought the cost of sanitary landfill down to where any city, town or community can afford it. A TRAXCAVATOR Shovel, with its one-man operation, can do every task that goes with the sanitary landfill method.

Steps in the Landfill Method

After the site is selected, the TRAXCAVATOR Shovel digs a trench, 4-6 feet deep and 15-20 feet wide. For a TRAXCAVATOR Shovel, that's only an hour's work on about a 40-foot trench. The soil is placed on the lip of the trench to provide a truck ramp. Refuse is dumped into the trench, spread, and thoroughly compacted by the TRAXCAVATOR Shovel's broad tracks. This packing is important to prevent settling.

The compacted refuse is covered

each day with a two-foot layer of earth. This is borrowed by the TRAXCAVATOR Shovel from the adjoining trench. By borrowing and filling, a new trench is ready when the old one is filled.

The trench is topped with a heavy layer of earth that is carefully compacted. This cover seals the refuse completely and provides the base for future improvements.

TRAXCAVATOR Shovel Versatility Pays Off

Each step of the landfill method is a job for TRAXCAVATOR Shovels. The one-man on the unit can quickly and efficiently get the work done at the lowest possible cost. And the versatile unit is not tied to the landfill operations. TRAXCAVATOR Shovels can dig, load, haul, stockpile, backfill, excavate, and they can do it in sand, clay, stone, caliche, snow, common earth or frozen ground. Only TRAXCAVATOR Shovels can spread their usefulness throughout the entire operation of the community. Long-lived and strongly-built for years of service, TRAXCAVATOR Shovels keep investment low.

Your "Caterpillar" Dealer Can Help You

The way to success with the landfill method is to select proper equipment, proper site, proper supervision and application. Your "Caterpillar" Dealer has trained sales engineers who



Big capacity and broad tracks get the covering and soil compacting job done in a hurry.

know the sanitary landfill method thoroughly. These men can sit down with your community leaders and supply the answers to all your questions on the system. They can help you select the proper equipment—the right model of TRAXCAVATOR Shovel (there are five with bucket capacities ranging from $\frac{1}{2}$ to 4 cu. yds.). They can help you find the right site...they can help you put the method in operation. This service is without obligation. Call on your "Caterpillar" Dealer and discuss your dumping problems with him or you can write direct to "Caterpillar" for factual folders on how to start a sanitary landfill and how other communities have used TRAXCAVATOR Shovels for efficient management. We're at your service!

**CATERPILLAR TRACTOR CO.
Peoria, Illinois**

TRACKSON
REG. U. S. PAT. OFF.

A SUBSIDIARY OF CATERPILLAR

**TRAXCAVATOR SHOVELS
TRACLOADERS
PIPE LAYERS
ANGLEFILLERS**



● A freeze-up can mean costly shop repairs or a minor "on-the-spot" change. American Frost Bottom Meters have a simple patented construction that permits the bottom casing to break by tension and relieve the internal pressure in the event of a serious freeze-up.

All the more delicate—most costly parts—including the gear train—are protected. The breaking pressure is pre-tested at the factory. Hundreds of thousands of meters in service are proof of the effectiveness of this design.

Ask for complete data.

BUFFALO METER CO.

2920 MAIN STREET, BUFFALO 14, NEW YORK

Get full details of this month's new products... mail your Readers' Service card today.

**CUT
Your CLEARING COSTS
Down to Earth with a**



HOMELITE *One Man
Chain Saw*



**27 POUNDS
4 HORSEPOWER
MORE POWER PER POUND
THAN ANY OTHER SAW**

When trees are in the way of the job, cut them down with a Homelite One Man Chain Saw. It's the fastest, easiest, most economical way to do it . . . cuts your clearing costs down to earth.

With this saw, one man can bring down an 18" pine in 16 seconds or an 18" oak in 28 seconds.

He can cut trees 48 inches in diameter *or more*. He can do his bucking, limbing . . . clear the whole mess out of there . . . in no time.

Only 27 pounds . . . easily operated by anyone . . . a Homelite has more power per pound than any other saw its size. Because it's the only saw its size with a 4 horsepower engine . . . a Homelite engine famous for dependability for more than thirty years.

Ask for free demonstration. Try it yourself. You'll be amazed at its outstanding performance.

Manufacturers of Homelite Portable
Pumps • Generators • Blowers • Chain Saws

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CORPORATION
2110 RIVERDALE AVENUE • PORT CHESTER, N.Y.

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For better TRICKLING FILTER results

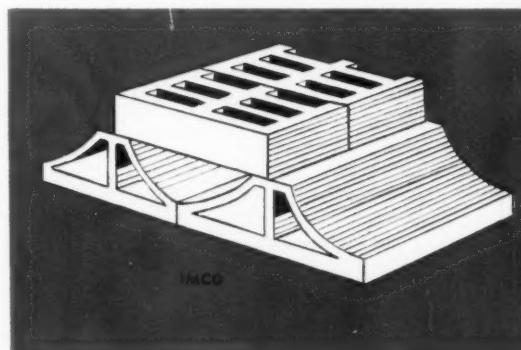
USE TFF INSTITUTE SPECIFICATION UNDERDRAINS

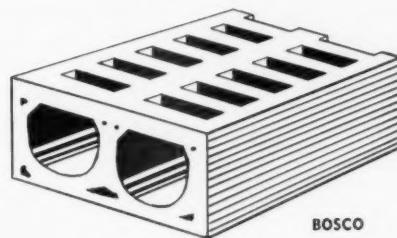
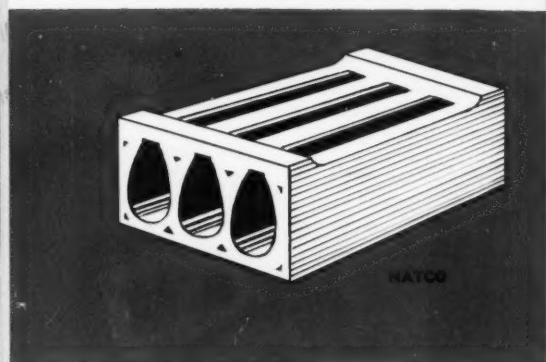
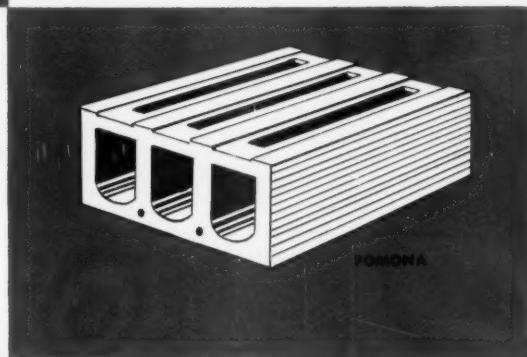
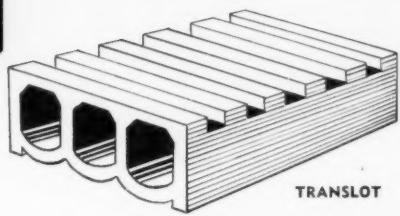
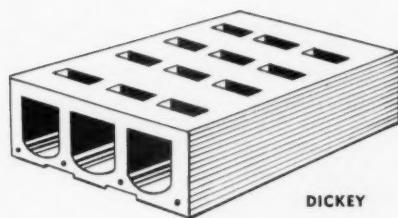
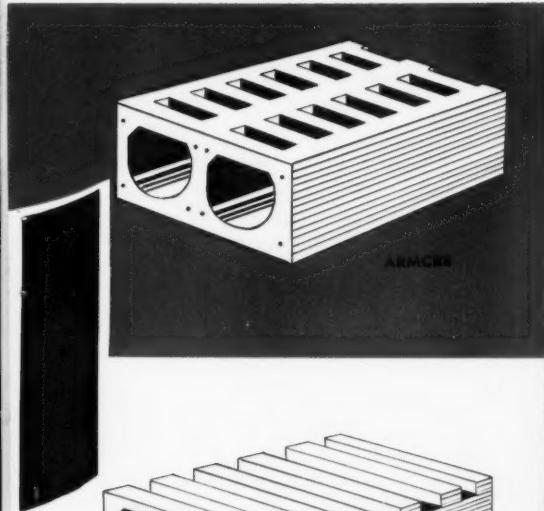
Trouble-free operation and better results are assured when Trickling Filter Floor Institute *specification* underdrains are used. Their wide use in all modern filters is daily proving the wisdom of their selection. The reasons are: they are scientifically designed for the purpose and they are made from the finest quality vitrified clay. The size of the top openings insures correct ventilation of all the filter media and free discharge of the filter effluent. The runoff channels are extra smooth for non-clogging quick drainage.

These blocks will carry applications up to 50 MGAD. Unskilled labor can lay them easily because they are light-weight and self-aligning. And the blocks are strong enough to work on after laying and to support safely even very deep filter media. These qualities make them best for all kinds and shapes of filters. On your next filter, use the best equipment you can get . . . and give it a Specification floor of *Vitrified Clay Filter Bottom Blocks*. Ask any member of this Institute for full engineering details. Write today.

All These Underdrain Blocks are:

- ✓ EASY TO LAY
- ✓ ACID RESISTANT
- ✓ PROVED BY USE
- ✓ AND WON'T CLOG





TRICKLING FILTER FLOOR INSTITUTE

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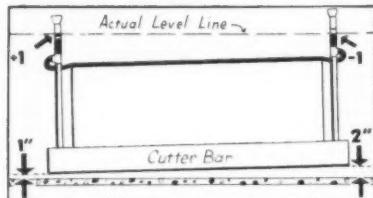
National Fireproofing Co.
Pittsburgh 22, Pa.

Industrial Materials Co.
Philadelphia 34, Pa.

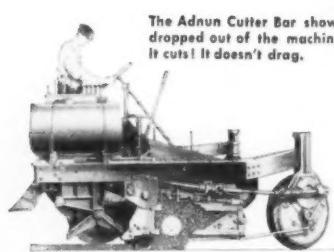
W. S. Dickey Clay Mfg. Co.
Kansas City 6, Mo.

The Difference better BLACK TOP PAVEMENT! —that assures

Ask About the Adnun Liquid Level



Being the only Black Top Paver with a one piece screed having a direct lift, the Adnun for the first time in the history of black top paving makes possible the holding of a positive level course over old road. The Adnun Liquid Level assures accurate correction for any slope at any station.



The Adnun travels on its own template, always accurate as you set it. Note that when the front wheel drops into a depression there can be practically no influence on the Cutter Bar.

YOUR Adnun starts smoothly without blocking, laying and traveling on its own template of just the thickness your "specs" call for. With the Adnun Oscillating Cutter Bar, the strike off is a cutting action free from the tearing that comes with dragged screeds. Overlapping action at the joint compacts the material against the parallel course and makes a tighter joint—a safer joint for modern high speeds.

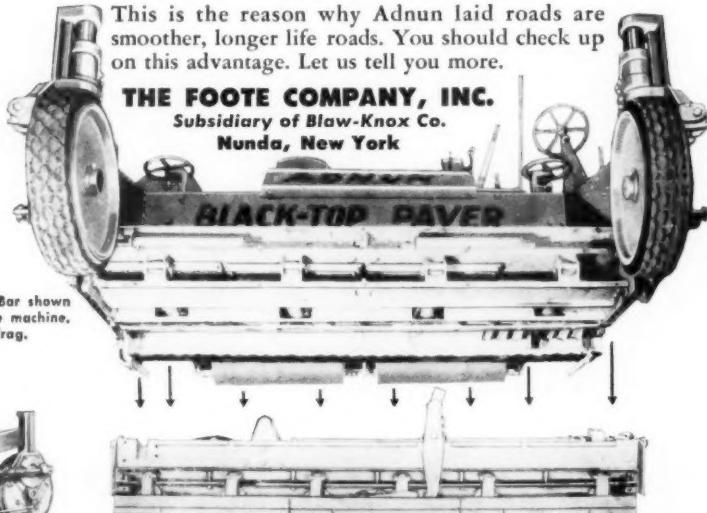
Cutter Bar Tooth design provides a compressing action that crowds material into depressions and cavities—smoothly, positively and without vibration that reduces machine life.

But more important is the Adnun advantage of Continuous Course Correction. This feature, the result of the fact that the influence of sub-base irregularities on the Cutter Bar is progressively reduced, means the practical elimination of irregularities with each successive course.

This is the reason why Adnun laid roads are smoother, longer life roads. You should check up on this advantage. Let us tell you more.

THE FOOTE COMPANY, INC.

Subsidiary of Blaw-Knox Co.
Nunda, New York



ADNUN

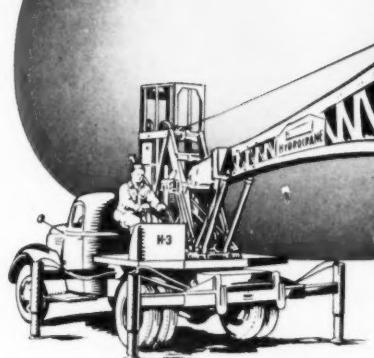
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BLACK TOP PAVER



Need more facts about advertised products? Mail your Readers' Service card now.

Here's a Boom That REACHES For Extra Jobs



The all-hydraulic Bucyrus-Erie 3-ton Hydrocrane with telescoping boom reaches into windows and box cars . . . over fences . . . under beams and overhanging branches . . . between wires and rafters — without moving crane an inch! Boom extends and retracts a distance of eight feet.

The outstanding advantages of telescoping boom plus precision hydraulic control and high speed travel combine to make the Hydrocrane ideal for setting sewer, water and gas pipe . . . digging manholes . . . emergency pipeline repair . . . moving sidewalk slabs . . . erecting lamp posts and utility poles . . . cleaning catch basins . . . dozens of

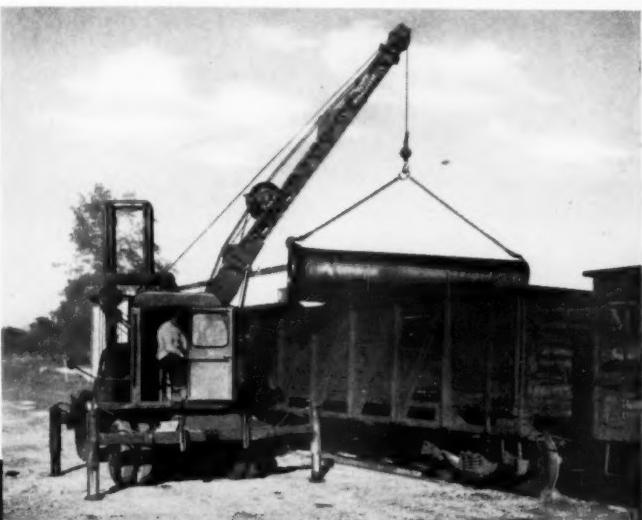
Here is the Hydrocrane in action. Every work function fully hydraulic — boom hoist and swing, load hoist, boom telescope, outrigger set and retract, bucket close.



lifting, digging, and material handling jobs.

In addition, crane can be quickly converted to hoe front-end in the field for trenching or digging transformer and meter pits . . . miscellaneous excavating. Conversion has actually been made in as little as four man-hours. See your Hydrocrane distributor on complete details.

160H52



Get full details of this month's new products . . . mail your Readers' Service card today.



Preferred power on sewer cleaning machines and related equipment — the world's most widely used single-cylinder gasoline engines on machines, tools, appliances used by municipalities, industry, construction, railroads, oil fields, and on equipment for farms and farm homes.

EARS ahead in design, performance, value —
Briggs & Stratton single-cylinder, 4-cycle, air-cooled
gasoline engines are *preferred* whenever dependable
air-cooled power is required. Briggs & Stratton
Corporation, Milwaukee 1, Wisconsin, U.S.A.

In the automotive field Briggs & Stratton is the recognized leader
and world's largest producer of locks, keys and related equipment.

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LEADERS IN PUBLIC WORKS

Kerwin L. Mick is chief engineer and superintendent of the Minneapolis-St. Paul Sanitary District and has been employed by that organization except for one year with the State Department of Health and the 3½ years he was in the Sanitary Corps of the Army in World War II. During that 3½ years he served with distinction in the Southwest Pacific, making the circuit up to the Philippines, where he was when the war ended. He is a graduate of the University of Minnesota, 1930, MS in Chemical Engineering.

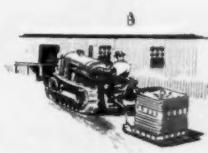
He has made many special contributions in the field of sanitary engineering, including several papers in the leading engineering magazines. In 1942 he received the Gus H. Radabaugh award of the Central States Sewage Works Ass'n. for the "best paper"; in 1943, he received the George B. Gascoigne Award of the FSWA for "outstanding contribution to the art of sewage treatment works operation"; and in 1945 and again in 1951 he received the William D. Hatfield Award for the "outstanding sewage works operation report" for large cities. He has been active in Federation matters as committee chairman; and he is a member of the ASCE, FSIWA, AIChE, NSPE and Sigma Xi. He is married and his hobbies are kodachrome photography and collecting classical music recordings. We think he also has a hobby for doing a good job, for he did this in the Army and he has been doing it at Minneapolis-St. Paul. He even makes his annual report interesting reading and attractive in appearance.



Loading out scrap material



Bulldozing



Industrial material handling



Backfilling foundations



Sidewalk snow plowing



Loading out topsoil

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...Thousands

Don't just take our word for the real, day-to-day usefulness of the Oliver "OC-3". Take the proof offered by the *thousands* of users . . . the *thousands* of uses . . . of this powerful little tractor. Just ask any owner what he thinks of his "OC-3". In the more than 12 years that the "OC-3" and its predecessor, the "HG", have been in production, they have built a reputation for user acceptance that's unequalled in their class. Proof of this is the fact that it's mighty hard to get a used "OC-3". Users just don't often sell their "OC-3" tractors.

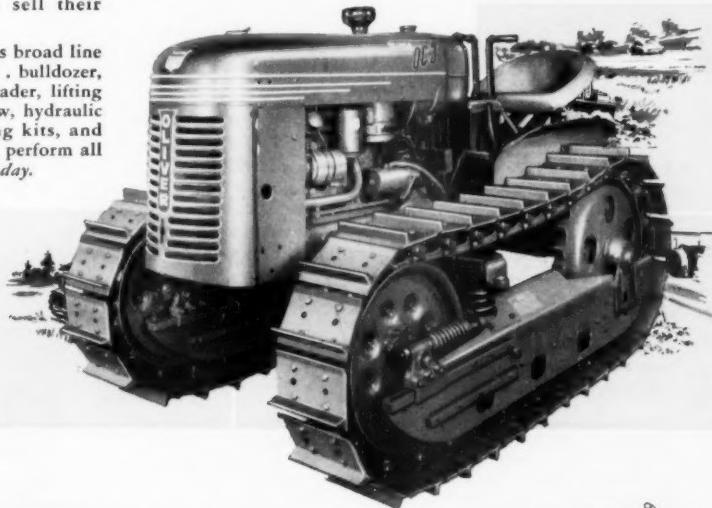
With an "OC-3" and its broad line of matched equipment . . . bulldozer, trailbuilder, front end loader, lifting fork, sidewalk snow plow, hydraulic drawbar, winch, logging kits, and many others . . . you can perform all sorts of useful tasks *every day*.

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Winch operations



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The Hotpoint Disposer™ food-waste disposer is easy to install in any sink... convenient... safe... odorless and economical. Simple to operate... keeps kitchens, sinks and hands clean. Does not overload or clog sewer systems. Can also be used with septic tank.

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The Hotpoint Municipal Plan provides a program by which your entire community can enjoy complete elimination of all garbage disposal problems. The Hotpoint Plan is based on documented experience and written specifically for municipal officials. A request from you will bring the complete story on how you can provide—

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- Health protection to the members of all families.
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- Garbage collection cost reduction.
- More digester gas for use and sale.
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- Elimination of food-waste before it becomes garbage.
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- Elimination of garbage collection problems.
- Elimination of garbage odors.
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And... it saves you money!

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(A Division of General Electric Company)

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**A complete line
for all types and
sizes of water pipe**



FOR SUPPLY AND DISTRIBUTION LINES

Style 38 DRESSER COUPLINGS

Proved dependable for over sixty years, on thousands of miles of municipal supply and distribution mains. Special rubber gaskets make a permanent joint, flexible enough to permit laying curves with straight pipe. Wrench is only tool needed. Available for plain-end steel, cast iron or other pipe, $\frac{3}{8}$ " ID to 72" OD and larger.



FOR SPLITS AND BREAKS IN CAST IRON PIPE

Style 82 REPAIR & TAP SLEEVE

Handy sleeve repairs breaks, holes and splits in straight run of CIP quickly and securely, without service interruption. Highly adjustable for off-size pipe. Also makes a handy tapping sleeve, when needed. Sizes 4", 6", 8" CIP.

Each Dresser Style is designed to meet a specific problem of pipe joining or repair. Convenient to use anywhere, Dresser Couplings are standard equipment with municipal water departments who appreciate the simplicity and speed of these couplings under difficult working conditions. Shown above is a representative group of Dresser

Catalogs and further information on request

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Need more facts about advertised products? Mail your Readers' Service card now.



FOR LEAKY BELL & SPIGOT JOINTS Style 60 ADJUSTABLE BELL-JOINT CLAMP

Highly adjustable Style 60 has wide use in water repair work. Especially good on locations subject to vibration, such as under railroad tracks, heavy traffic spots, and on bridges. Sizes 3" through 60" CIP.



FOR BRANCH CONNECTIONS TO EXISTING LINES Style 91 PIPE SADDLE

A quick easy way to make branch connections to existing lines when tapping sleeves, tees, or other methods are not desirable. Standard saddle is equipped with exclusive Dresser rubber gasket. Also available with lead gaskets or without gaskets. Malleable and steel construction for steel and CIP. Sizes $1\frac{1}{2}$ " to 20" OD.



FOR JOINING SMALL PIPE Style 65 "NO-THREAD" FITTINGS

No threading or exact pipe alignment is necessary with these simple, speedy fittings. Just stab over plain pipe ends and tighten bolts with a wrench.

Style 90 (steel) for underground work, and Style 88 (brass) for copper tubing available. All standard shapes.



FOR LEAKS, BREAKS, SPLITS UP TO 8" IN CIP Style 57C CAST SPLIT SLEEVE

Standard equipment with emergency crews for repairing unexpected breaks requiring immediate attention. Used successfully for years by water departments everywhere.

Each sleeve is tested with 60-lb. air pressure and 500-lb. hydrostatic pressure before shipment. Sizes 2" to 12" CIP.

products for the municipal field. A complete list includes: Couplings • Insulating Couplings • Reducing Couplings • Long Sleeves • Tees, Ells, Crosses • Pipe Saddles • Expansion Joints • Split Repair Sleeves • Bell-Joint Clamps • Collar, Screwed Fittings, Clamps, Band and Saddle Clamps • Service Fittings.

MANUFACTURING DIVISION

Dresser Manufacturing Division (One of the Dresser Industries), Bradford, Pa. Sales Offices: New York, Philadelphia, Chicago, Houston, San Francisco. Warehouses in Houston and South San Francisco. In Canada: 629 Adelaide St., W., Toronto, Ont.

On saved shifting time alone

You can gain up to 25%



*THE NEWEST, FINEST
LINE ON EARTH!*

HD-5
40 drawbar hp.,
11,250 lb.

HD-9
72 drawbar hp.,
18,800 lb.

HD-15
109 drawbar hp.,
27,850 lb.

HD-20
Hydraulic Torque
Converter Drive, 175 net
engine hp., 41,000 lb.

PERCENT MORE PRODUCTION

WITH THE MODERN SHIFT PATTERN ON ALLIS-CHALMERS HD-9 AND HD-15 TRACTORS

It takes just half the time and effort to change from low forward to fast reverse with the Allis-Chalmers HD-9 and HD-15 transmission. This shifting time saved becomes production time gained on bulldozing and other jobs calling for a short forward-backward cycle. For example, job studies prove that on backfilling, pusher work, working around large excavators, digging and loading with front-end shovels—other jobs where frequent shifts are required—you can make five passes in the time usually required to make four...actually increase production up to 25 percent.

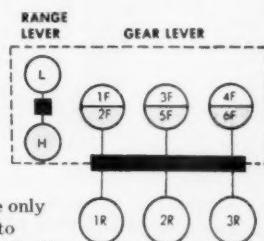


Here's how it works

You go from any forward to any reverse speed with one simple shift of the gear lever. The only time you touch the range lever is to select the forward range you want for the job to be done—just set it and forget it.

The constant-mesh Allis-Chalmers transmission makes shifting smooth and effortless...without gear clashing. And it's so easy that the operator can *always* take advantage of high-speed reverse.

This exclusive shift pattern, together with all-steel welded construction, unit assembly, 1,000-hour lubrication, are just a few of the reasons you get more work done with the new *designed-for-your-job* Allis-Chalmers tractors.



ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

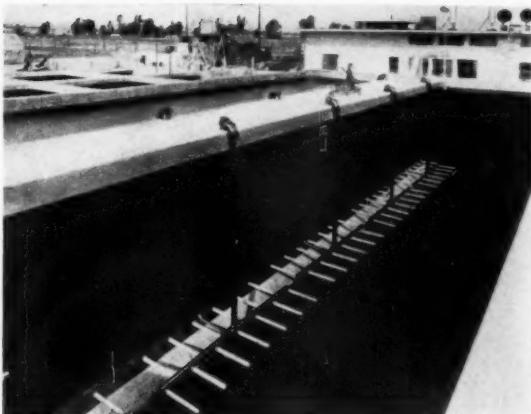
Two installations of porous tubes in Chicago Pump Company's Swing Diffusers. Tubes in operating position at the bottom of an empty sewage tank (above) are swung to the tank top for easy inspection and servicing (below).

More uniform aeration with Norton **ALUNDUM*** tubes, because... *they're seamless!*

Long experience with a number of installations in activated sludge sewage plants has established the fact that the most uniform and efficient diffusion of air is accomplished with seamless tubes. Only Norton Alundum tubes have this seamless feature.

Important, too, is the fact that they're the *only* porous tubes made by Norton's patented "controlled structure" process — which means that, like all Norton porous mediums, they're unequalled for uniform distribution of pores.

Finally, their exceptional resistance to breakage, chipping and acid and alkaline conditions cuts replacement and maintenance costs throughout a long, efficient service life.



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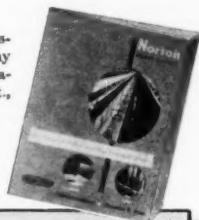
Norton ALUNDUM porous mediums — plates, tubes and discs — are made in a wide range of sizes. Plates for rapid

sand filters in water filtration; plates and tubes for aeration in activated sludge treatment; seamless tubes for diatomaceous filters in municipal swimming pools.

GET THE COMPLETE STORY

The charts, tables and other helpful data in Norton's illustrated booklets show the way to new efficiency and economy in your use of porous mediums. Ask your Norton representative, or write to NORTON COMPANY, 228 New Bond St., Worcester 6, Mass.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries



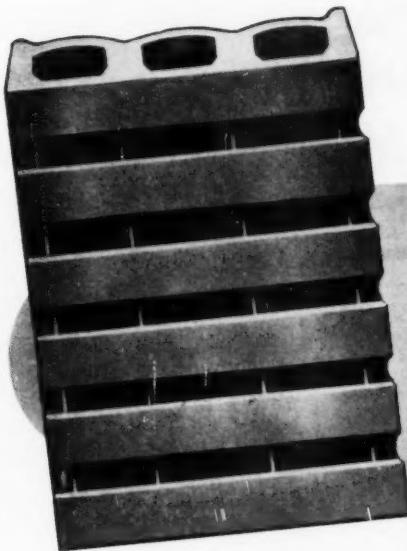
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POROUS MEDIUMS

Making better products to make other products better

NORTON COMPANY, WORCESTER 6, MASSACHUSETTS

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here's a
Winning SEWERAGE TEAM!

**TRANSLOT =
FILTER BLOCK**

**TEX-VIT®
SEWER PIPE**



TRANSLOT GIVES YOU...

3 BIG DUCTS FOR FAST DRAINAGE AND AERATION!
5 LATERAL SLOTS FOR FAST-FLOWING CROSS VENTILATION!

TEX-VIT PIPE GIVES YOU...

GUARANTEED PERFORMANCE FOR FIFTY YEARS!
ABSOLUTE RESISTANCE TO ACIDS, ALKALIES, GASES!

YES, here's a team that assures long service life for any sewerage system, anywhere! Industrial wastes, detergents, and other chemicals can't affect TRANSLOT Filter Block or TEX-VIT Pipe. Trickling filters built with TRANSLOT have maximum ventilation and maximum drainage—because TRANSLOT has four times as much opening as other devices. It is easy and inexpensive to install, too . . . the basic size (a full $11\frac{3}{4}$ " x 18") is just right for one man, and there are special sizes to solve every installation problem. TEX-VIT Sewer Pipe is equally versatile—is available in both Standard and Extra Strength, with a complete line of fittings. A special ceramic inside-glaze boosts flow and speeds runoff. And both these famous products are backed by a written 50-year guarantee!

DRAIN TILE is made to exacting standards and is available in a complete range of sizes for every drainage requirement.



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EQUIPMENT DATA TO HELP YOUR PUBLIC WORKS PROGRAM

The engineering information in these helpful catalogs will aid you in Engineering and Public Works programs. Just circle numbers you want on the coupon or write the manufacturer direct and mention PUBLIC WORKS.

Ice Control Without Salt Corrosion

233. This year, team up Banox with salt used for ice control and stop the complaints of salt corrosion. Just 1 pound to 100 pounds of salt neutralizes corrosive effects. Banox is harmless, colorless, odorless. Check the coupon now for full details on this chemical. Calgon Inc., Hagan Bldg., Pittsburgh 30, Pa.

Grinders and Shredders

For Sewage Treatment Plants

243. Gruendel screenings shredders may be connected with bar screens at either new or existing plants to reduce operating expense and simplify disposal problems. Full descriptions of screenings shredders and sludge shredders are reported in Bulletin SG10, issued by Gruendel Crusher & Pulverizer Co., 2915 N. Market St., St. Louis 6, Mo. Just check the coupon.

Spreaders for Ice Control Work

Save Labor and Speed Job

261. Only the driver is needed to spread salt or abrasives for ice control when a Flink Tail-Gate Spreader is used. Hydraulically driven, fully automatic unit is controlled from the cab. Check the coupon for the complete story. The Flink Co., Streator, Ill.

Design Data For

Wet Pit Pump

52. Two types of vertical, centrifugal wet-pit pumps, a heavy duty bulb pump for handling solids-free liquids and a screenless sewage ejector are described in Bulletin 3500 of York Pump Brothers Co., 100-13 Ruby St., Melrose Park, Ill. Pump and motor selection tables, typical layouts for drainage sums and municipal booster stations and other helpful engineering data are included in this 24-page bulletin. Just check the coupon for your copy.

What to Do About

The Leaf Problem

93. Quick disposal of leaf accumulations in streets is easy with the Wayne Leaf Loader that pulverizes packed and piled leaves and conveys them into a dump truck. Unit is close

coupled to the truck so no extra operator is needed. Full details in Form 121, available by checking the coupon. Wayne Mfg. Co., 1201 E. Lexington Ave., Pomona, Calif.

What You Should Know About Chemical Proportioning Pumps

38. In an attractive new bulletin you will find latest information on the Heavy Duty Chem-O-Feeder, plus many installation diagrams, construction and operating details, list of chem-



icals fed and other helpful information on constant rate and flow proportional chemical feeding. Get your copy from Proportioners, Inc., Providence 1, R. I., by checking the coupon.

Fast Mowing in Hard-to-Reach Places

163. The lightweight, power driven Scythe cuts smoothly near walls and trees and in rocky, hard-to-reach places, does the job 4 times faster than hand methods. Interchangeable chain saw unit, the Sawette, cuts trees and other growth up to 6" diameter. Check the coupon for illustrated folder offered by Hoffco, Inc., Richmond, Ind.

Avoid Needless Digging With This Valve Box Locator

178. Convenience and accuracy are keynotes of the Aqua Valve Box Locator described

PUBLIC WORKS for October, 1952

in a full color folder by Aqua Survey and Instrument Co., 2518 Leslie Ave., Cincinnati 12, Ohio. Cobalt alloy steel dipping needle is factory-set for any geographic location. Get full details by checking the coupon.

Floatless Liquid Level Controls

92. Complete descriptions of electrode type floatless liquid level control systems, including control units, electrodes and fittings, panel assemblies and diagrams of typical installations for all types of municipal service are covered in the 32-page catalog of Charles F. Warren Co., 1956 W. Eleven Mile Rd., Berkley, Mich. Check coupon for your copy.

The Engineering Behind Your Road-Building Equipment

279. How equipment is "Engineered to Perform" is revealed in a new 12-page booklet of that title published by Caterpillar Tractor Co., Peoria, Ill. Pictorial stories show how research and engineering operations result in machine durability and performance. Get your copy of Form 30429 by checking the coupon.

Get Latest Data On Automatic Backwash Filter

180. The Hardinge Automatic Backwash Rapid Sand Filter for municipal and industrial waste supplies all the coverage an industrial waste application can feature. Bulletin 46-A of the Hardinge Co., Inc., York, Pa. The filter can be kept constantly in operation since during the cleaning cycle only one compartment at a time is out of service. Details of construction and operation are fully described and illustrated. Check the coupon for a copy of this bulletin.

Site-Cast Concrete Pipe Saves Construction Dollars

194. A new brochure, "Large Diameter Pipe Made at the Site", tells how the Universal Concrete Pipe Co., Columbus, Ohio, ships mobile equipment and key personnel to large projects where local labor and materials are used to produce large-diameter and long-length reinforced concrete pipe. Costs are cut and shipping damage prevented by this method. Check coupon for details.

Be Sure to Investigate These Hydraulic Loaders

157. Reese heavy duty bucket loaders feature a lifting action that holds the bucket at a set angle in all lifting positions, thereby reducing operator fatigue and increasing output. This and other unique engineered features make the machine well worth investigating. Check the coupon today for fully descriptive bulletins. Reese Engineering Co., 9517 Rush St., El Monte, Calif.

Complete Data on Drains and Grease Interceptors

268. Wade Catalog W-55-B contains complete descriptive illustrations, detail drawings, dimensions, weight and price for every type of floor drain and deck drains, backwater valves, grease interceptors, manhole frames and covers.

READERS' SERVICE DEPT. PUBLIC WORKS MAGAZINE 310 East 45th Street, New York 17, N. Y.

Please send me the following literature listed in
the Readers' Service Dept. of your October issue.

Booklets from pages 40 to 56:

20	21	23	24	25	27	29	33	34	38	39	41	46	52	55	59	62	64	65
67	75	76	81	82	83	86	87	89	92	93	94	95	98	99	100	102	106	108
112	117	119	120	121	123	124	128	129	136	137	141	143	145	149	150	151	157	151
163	164	165	166	168	170	171	174	178	180	181	183	187	189	191	194	198	200	208
209	211	213	214	216	218	221	223	224	227	230	232	233	234	237	238	241	244	245
246	248	249	253	258	261	264	268	270	272	275	278	279	280	281	283	285	296	297
298	304																	

New Products, pages 139 to 143:

10-1	10-2	10-3	10-4	10-5	Occupation
10-6	10-7	10-8	10-9	10-10	
10-11	10-12	10-13	10-14	10-15	Street
10-16	10-17	10-18			City

State _____

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.. see the World's Shortest "Conveyor"

**Does the work of a full-length
conveyor at a fraction of
the cost.**

There is no expensive conveyor or elevator in the Model "40"—no complicated, troublesome mechanism to repair and maintain. All street dirt—including bricks, bottles, cans and sticks—passes between the exclusive, patented Deflector Bar and the broom, then is "flipped" forcibly into the forward end of the hopper in a steady stream.

From spray bar to rear broom, the Model "40" is engineered for efficient, low cost, trouble free performance. A catalog which tells the whole story is yours for the asking ... from us or your nearby A-W distributor.

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U. S. A., Subsidiary of Baldwin-Lima-Hamilton Corporation

Austin  **Western**

To order these helpful booklets check the coupon on page 40.

and many other drainage and plumbing specialties. Information is easy to find in this well-organized catalog, available by checking the coupon. Wade Mfg. Co., Elgin, Ill.

Standard Translet Blocks For Filter Underdrains

170. Effective filter floors must provide ventilation as well as clear-drainage. With the Translet block you get fast drainage and aeration plus free-flowing cross ventilation through lateral slots. Full data on this large, fast-laying block from Texas Vitrified Pipe Co., Mineral Wells, Texas by checking the coupon.

For Faster, Easier Blueprint Filing

208. Big, loose piles of blueprints are hard to handle. Now you can get wrinkle-free storage and easy indexing in the blueprint file offered by Empire Development Co., 15 Park Row, New York, N. Y. Each file accommodates 1,000 prints. Check coupon for details.

Underdrains—Hidden But Important Filter Components

248. For filter bottoms this firm makes "Armeto" vitrified salt glazed floor blocks which provide ducts occupying 50% of the floor cross-section and air openings aggregating over 24% of the floor area. Described in several leaflets and data sheets. Ayer-McCarel-Reagan Clay Co., Brazil, Ind.

Be Sure to Investigate The "Jeep-A-Trench"

270. For numerous small trenching jobs where maneuverability and road speed are important factors, be sure to check the "Jeep-A-Trench". Several models for attachment to Willys "Jeep" or other certain tractors. Full data from Auburn Machine Works, Inc., Auburn, Neb. Check the coupon.

Be Sure to Investigate

Two-Piece Filter Floor Construction

285. Advantages claimed for trickling filter floors constructed of IMCO Two-Unit blocks include: greater mechanical strength; maximum aeration efficiency; smooth flow line

in drainage channels; and construction simplicity. Full information on this long-tested floor system is available from Industrial Materials Co., Somerset St. & Trenton Ave., Philadelphia, Pa., or by checking the handy coupon.

BUSINESS AND ADMINISTRATION

What Bonded Performance Can Do For You

121. On every construction job your city or county should be protected from a contractor's default or inability to perform the work. Learn what "Bonded Performance" can do for you. Write National Surety Corp., 4 Albany St., New York, N. Y., or check the coupon for full details.

Booklet Outlines Scheduled Preventive Maintenance

223. An interesting case history on reduction of equipment failures and less "downtime" through scheduled preventive maintenance is offered by Remington Rand Inc., Management Control Library, 315 Fourth Ave., New York 10, N. Y. Ask for Folder KD656 or check the handy coupon for your copy.

CIVIL DEFENSE

Are You Ready Now To Make Main Repairs?

214. Broken water mains can quickly be repaired when you have "Skinner-Seal" Split Coupling Clamps on hand. Get Skinner Catalog 41 now—this handsome 40-page book shows how to make every type of pipe repair and covers a complete line of clamps to do the job quickly and easily. Just check the handy coupon for your copy. M. B. Skinner & Co., So. Bend 21, Ind.

Get the Facts on Air Raid Sirens

86. There's more to be considered in air raid warning sirens than the loudness of the signal. Get complete information on efficient size and spacing of sirens from Federal Enterprises, Inc., 8733 So. State St., Chicago, Ill., by using coupon.

Emergency Chlorination and Main Sterilization

213. Get data on portable emergency chlorination units designed to save time in cases of broken mains or substitute water supplies. Use coupon to order copies of publications 22-C; 58-C; and 408 from Wallace & Tiernan Co., Newark 1, N. J.

REFUSE COLLECTION AND DISPOSAL

20 Questions and Answers On Sanitary Landfill

75. The advantages of sanitary landfill, factors in site selection, kind and size of equipment needed, capacity of a given site and other important engineering considerations are discussed in Form 100 prepared by the Trackside Corporation, P. W. Milwaukee 1, Wis. Check the coupon for complete information on this refuse disposal method.

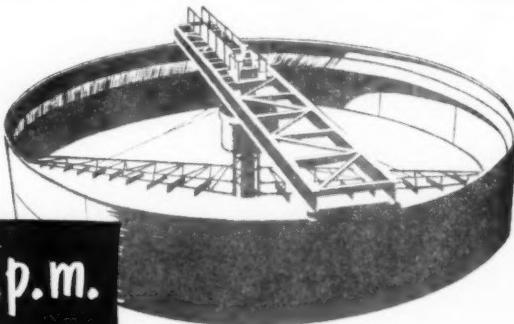
How Load-Packers Reduce Refuse Collection Costs

122. The sequence of operation for fast loading and refuse compression in the Gar Wood "Load-Packer" is illustrated and described in 8-page folder M 60, which also provides size data and details of hydraulic equipment. Be sure to check all features of the efficient Load-Packer system. Check coupon or write Gar Wood Industries, Wayne Div., Wayne, Mich.

Carter Circular Collectors

efficiently remove sludges & solids
from liquids having turbidity
contents as high as

60,000 p.p.m.



specify CARTER for these advantages:

Horizontal or vertical influent offering central subsurface, radial feeding . . . direct-mounted vertical speed-reducer combination type drive, with mechanical-electrical overload protection . . . automatic continuous scum removal for full radius of primary tanks . . . positive plow-blade sweeping of tank bottom to central discharge hopper . . . central effluent well and peripheral overflow weir equi-distant at all points from feed entrance.

- There is no job too tough for the Carter Circular Collector. In small plants or large, whether the application be water, sewage or industrial waste, this equipment can be depended upon to collect solids continuously and efficiently, from the full radius of the tank, regardless of sedimentation rate.

Such performance, under virtually every adverse operating condition, has proved to engineers that the Carter Circular Collector is the "backbone" of successful clarification.

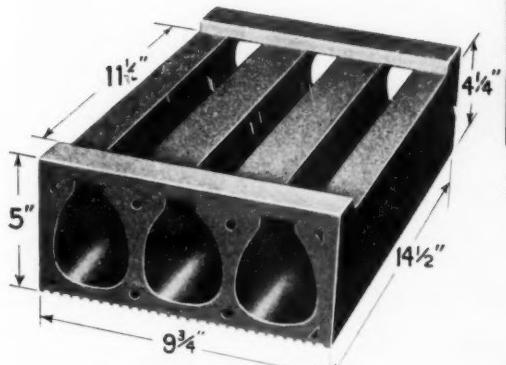
WRITE TODAY for free copy of Bulletin #4906 on Carter Circular Collectors

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NATCO

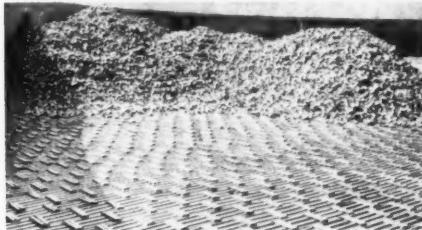
**Trickling Filter Beds of Sewage Disposal Plants
Combines maximum capacity with maximum strength and utility.**



Standard Unifilter Block

Natco Salt Glazed Unifilter Blocks used for underdrains of either standard rate or high rate trickling filter systems, combine low absorption qualities with great strength, ruggedness and durability. Balanced in weight and size for easier handling, Natco Unifilter Block are laid speedily and at low cost.

A one-piece underdrain unit with egg-shaped run off channels, Natco Unifilter Blocks provide maximum flow. Shapes are available to meet the requirements of all typical trickling filter projects. Send us your plans and our Engineering Department will gladly cooperate with you in working out the most efficient and most economical use of Natco Unifilter Blocks for any project.



View of sewage disposal plant, first of three units, Worcester, Mass., showing use of Natco Unifilter Block for trickling filter bed. Eight beds in each unit each 176 ft. in diameter. Hayden, Harding and Buchanan, Boston, Engineers. V. Berletta & Sons, Roslindale, Mass., Contractors.

Salt Glazed Unifilter Block Underdrains for



In the above view of the Sewage Disposal Plant at Lancaster, Ohio, the Unifilter Blocks are laid in place ready for the filter media. Engineers, Burgess and Niple, Contractors, Cause and Saunders.

WRITE NOW FOR YOUR COPY OF

BULLETIN UF-3

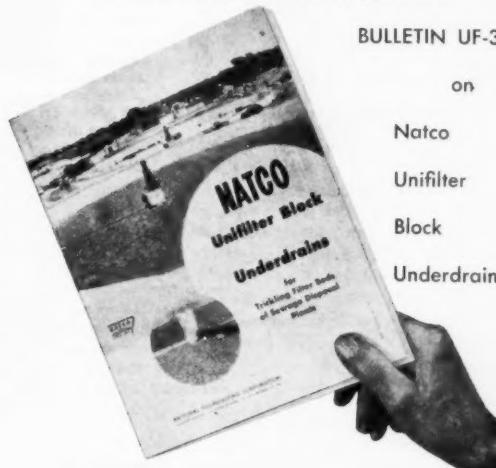
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Natco

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Please send me a copy of your new bulletin on Natco Salt Glazed Unifilter Blocks.

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Heltzel
BUILDS IT BETTER

HELTZEL HELPS CONSTRUCTION DOLLARS GO FURTHER

ANOTHER HELTZEL JOB

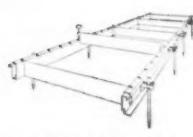
SAVING COST AND TIME ON A HOSPITAL CONSTRUCTION JOB

PROBLEM: To set a curb fast enough to be completed for a paving job scheduled on the following day. Available labor lacked special skills and experience.

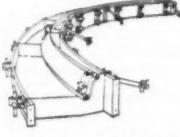
ANSWER: Standard Heltzel dowel joint curb forms were used on the job with economy of time and money. Common labor easily managed setting of the forms because Heltzel forms are designed with exclusive, practical aligning and staking devices.



COMBINED CURB AND GUTTER FORMS



HELTZEL SIDEWALK FORMS



HELTZEL RIGID RADIUS FORMS



HELTZEL FLEXIBLE FORMS



The Heltzel Steel Form & Iron Company

Construction Equipment Since 1910



WARREN, OHIO

Investigate This Plan For Garbage Elimination

144. A new presentation, written especially for municipal officials, offers a modern solution for the garbage disposal problem. Be sure you have this up-to-date information on the elimination of city garbage collection by the use of Hotpoint Disposal units. Check the coupon now. Hotpoint Disposal Department, 3600 West Taylor St., Chicago 44, Ill.

Save Garbage Collection In Defense Housing

181. Defense housing projects won't drain manpower for garbage collection when Westinghouse Waste-Away Food Waste Disposers are installed in each kitchen. Helpful information for community planners is offered by Westinghouse Electric Corp., Electric Appliance Div., Mansfield, Ohio. Just check the coupon.

POWER AND LIGHT

Modern Power Plants Need Diesel Economy

67. Baldwin Series 700 diesel engines are described in a new bulletin, No. 320, just issued by the Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa. These engines are four-cycle with a 17-inch bore, 20-inch stroke, 257 to 375 rpm. Horsepower ratings range from 710 hp to 2,080 hp. Check coupon now for full data.

Gas-Diesel Engines for Low Cost Municipal Power

283. Be sure to get the latest catalog on Cooper-Bessemer gas-diesel engines for dependable, low cost electric power in your city. Full details are available by writing to the Cooper-Bessemer Corp., Mt. Vernon, Ohio, or just check the handy coupon.

SNOW AND ICE CONTROL

Uniform Salt Spreading Saves Material

145. The wide, thin pattern provided by Tarco "Scotchman" spreaders avoids salt waste, saves time and labor. Get Folder BL for full details on this spreader and table of material application rates. Use coupon or write Tarrant Mfg. Co., Dept. PW, Saratoga Springs, N. Y.

Huber Maintainer Has Year 'Round Usefulness

151. A new bulletin shows how the sturdy Huber Maintainer will work for you the year 'round on maintenance jobs, berm leveling, road planing, bulldozing, snow plowing, brooming, mowing shoulders and as a patch roller. Good ideas on how to do all these jobs in Bulletin No. M-138. Write Huber Manufacturing Co., Dept. PW, Marion, Ohio.

Get Tough Blades and Cutting Edges For Your Construction Equipment

221. Controlled analysis steels used in Shunk blades and cutting edges for graders, scrapers, dozers, and snow plows mean long life and wear resistance to give you more value for your maintenance dollar. Full data for ordering blades and scarfer teeth for standard and special equipment is available from Shunk Mfg. Co., Bucyrus, Ohio. Check the coupon today.

Snow Plows for Every Street and Highway Need

227. In a new bulletin, No. 51-F, full details are given on the Frink reversible trip-blade "Sno-Plow," which has special design features to eliminate chatter and to permit quick adjustment to nine plowing positions or scraping position for ice removal. Check the coupon for your copy. Frink Sno-Plows, Inc., Clayton, N. Y.

Easy Storage Methods For Rock Salt

230. Low-cost storage for rock salt is described in a pamphlet available from In-

Duluth "does everything" with PAYLOADERS

Three years of "PAYLOADER" use finds Duluth taxpayers and city officials united in their praise of "PAYLOADER" tractor-shovels. The city's fleet of four machines is kept busy all year 'round on street, park, water, gas and sewage programs. Duluth officials have proved that "PAYLOADERS"

can do much to provide adequate city services in spite of limited budgets and staffs. In this they echo the experience of cities, counties, townships and states from coast to coast. You are invited to write for full data. The Frank G. Hough Co., 709 Sunnyside Ave., Libertyville, Illinois.



Park Department

The maintenance of thirty-five miles of roadways, plus ball parks, playgrounds, a zoo and golf courses keeps its Model HF "PAYLOADER" busy spring, summer, winter and fall. It loads dirt, gravel, oil-mix, stumps, timber, compost and leaves. The Superintendent says, "We have done many things we never had time to do before. This year we raised the level of the entire ball park and levelled all infields with our 'PAYLOADER'."

Water—Sewer—Gas Department

uses its Model HF "PAYLOADER" to grade ahead of trench-digging . . . to load dirt and materials, to load sand for backfill, to backfill trenches, unload and load pipe at storage, unload pipe at the job and to carry and lower it into place. Because the "PAYLOADER" operates easily in heavily congested areas and moves quickly from job to job the department accomplishes more work with its limited budget.

Public Works Department

Two 4-wheel-drive 1½ yd. Model HM "PAYLOADERS" are mainstays for street and alley work. They load sand, dirt, refuse, leaves and snow. V-plow attachments make them very effective snow fighters whose powerful hydraulic lift enables them to bust any drift. The Superintendent says, "The use of our "PAYLOADERS" is limited only by the jobs we have to do. They'll double for us on almost any job, wherever it is".



PAYLOADER®
THE FRANK G. HOUGH CO. • Since 1920



761 Sunnyside Ave.

Libertyville, Ill.

Need more facts about advertised products? Mail your Readers' Service card now.

To order these helpful booklets check the coupon on page 40.

International Salt Co., Scranton, Pa. Get your copy and check all methods for storing salt in bag or bulk ready for winter use. Use the handy coupon.

Motor Driven Tailgate Spreader Fits on Your Truck

246. Hi-Way Model DD Tailgate Spreader can be quickly attached to any standard dump truck body for easy, uniform application of abrasives or salt to icy roads; for resurfacing operations; etc. For this complete catalog. Get full data on this durable and dependable spreader from Highway Equipment Co., Cedar Rapids, Iowa. Check the coupon today.

CONSTRUCTION EQUIPMENT AND MATERIALS

How to Keep Trenching Jobs on Schedule

24. The easy maneuverability of the tough, compact Cleveland Model 95 "Baby Digger" makes it well suited for the difficult job of trenching past the many obstacles of city and suburban work. Multiple digging and crawler speeds handle all soil types and trench widths up to 24". Get Bulletin S-32 from Cleveland Trencher Co., 20100 St. Clair Ave., Cleveland 17, Ohio.

Municipalities Make Equipment Dollars Go Further

55. Be sure to get your copy of "Saving Facts", a new illustrated booklet prepared by The Oliver Corp. that shows how equipment dollars can be stretched on municipal work. Text and photos describe the application of tractors and money-saving attachments in street maintenance, snow removal, waste disposal, pipe laying and other projects. Write The Oliver Corp., Industrial Div., 19300 Euclid Ave., Cleveland 17, Ohio, or check coupon.

Tractors for Counties, Cities and Contractors

76. An attractive 24-page catalog portrays the Allis-Chalmers HD-5 crawler's abundant capacity and ability to meet the variable needs of counties, townships and contractors. Photographs and cutaway views illustrate its rugged construction and simplified maintenance. Use coupon or write Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee 1, Wis.

Examining a Tractor Piece by Piece

99. The new 32-page catalog published by International Harvester Company should be studied by every tractor owner, for in it each unit from engine to track of the TD-9 Diesel is considered separately. These piece by piece discussions are supplemented by notes on easy servicing, versatile applications and attachments for every need. Get your copy of form CR-313-A from International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill., or check the handy coupon.

Helpful Bulletin Shows Roadbuilding Methods

141. Laying base or surface aggregates, free-flowing hot or cold bituminous mixtures and plant-mixed stabilized soil with the Jaeger paver type aggregate spreader are described and illustrated in Catalog SPS-1. Get data on this variety of roadbuilding methods and full applications by checking the coupon. Jaeger Machine Co., 400 West Spring St., Columbus 16, Ohio.

Profitable Construction with Payloaders

234. A comprehensive, 12-page catalog filled with on-the-job photos showing a wide variety of earth-moving, material handling, lifting and carrying jobs being performed by the multi-purpose tractor-shovels known as "Payloaders" is now available. Helpful job data, specifications and features of the complete Payloader line are included, with illustrations of useful accessories. Copies of this colorful catalog No. 217 can be obtained from The Frank G. Hough Co., 761 Sunnyside Ave., Libertyville, Ill., or by checking the coupon.

A "Quick-Way" Truck Shovel Will Handle Your Job

82. Four models of "Quick Way" truck shovels, $\frac{1}{2}$ to $\frac{3}{4}$ yd. capacity and trench box, backhoe, crane shovel, clamshell, pile driver or dredge attachments are ready to handle most every type of public works project. Get complete details by checking the coupon or write to "Quick Way" Truck Shovel Co., Box 1800, Denver 1, Colo.

Be Sure to Investigate The Gledhill Grader

117. For economical maintenance of streets and highways, be sure to check the advantages offered by use of the Gledhill grader, product of the Gledhill Road Machinery Co., Galion, Ohio. For complete specifications on several models, just check the coupon.

Vibrating Screen Attaches To Your Loader

119. A vibrating screen which may be attached to any conveyor or bucket loader to discharge directly into a truck is available from Klemm Mfg. Co., 4700 W. 12th St., Sioux Falls, S.D. This unit features a parabolic deck which spreads material to utilize full screen area. Complete details available by checking the coupon.

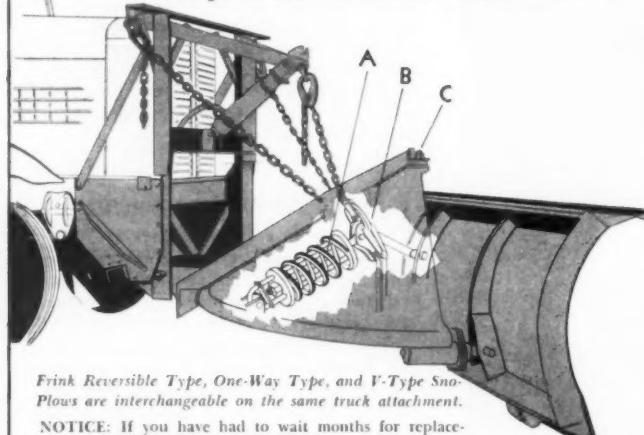
Helpful Booklet on Carryable Centrifugal Pumps

129. A booklet prepared to give practical information that will guide you in choosing the best type of pump for your requirements is offered by the Homelite Corp. Both gasoline and electric models are discussed, and requirements outlined for many applications. Just check the coupon for your copy. The Homelite Corp., 2125 Riverdale Ave., Fort Chester, N.Y.

Air Cooled Engines for Hundreds of Applications

137. Tested under severest conditions of long, hard use, these engines have earned world wide recognition as the "right" power of hundreds of applications. Get latest bulletin from Dept. PW, Briggs and Stratton Corp., Milwaukee 1, Wis.

THE NEW REVERSIBLE FRINK Trip-Blade Sno-Plow...



Frink Reversible Type, One-Way Type, and V-Type Sno-Plows are interchangeable on the same truck attachment.

NOTICE: If you have had to wait months for replacements for your present equipment then you will appreciate the service that we can now offer you.

You have numerous advantages over the average reversible plow with this new trip-blade Frink Sno-Plow. These plows are built with a unique pre-loaded trip spring (Fig. A in the cutaway drawing at left) and a specially designed linkage (Fig. B) that keeps the pressure constant throughout the tripping action.

This prevents chattering, no matter what position the mouldboard is in. These two units operate to quickly return the plow to a normal working position immediately upon passing an obstruction, without jumping up and losing snow at the ground line.

The pivotal point (Fig. C) of this plow is directly over the center of the mouldboard, thus eliminating the swinging of the mouldboard to one side or the other of the truck when the blade is reversed.

Cleaner road surfaces and smoother operation are yours with Frink Reversible Sno-Plows.

For details of this new Sno-Plow write for catalog 51-F to nearest address below, Box PW 5210.

FRINK SNO-PLOWS, INC., CLAYTON, NEW YORK
DAVENPORT-BESLER CORP., DAVENPORT, IOWA
FRINK SNO-PLOWS OF CANADA, LTD., TORONTO, ONT.

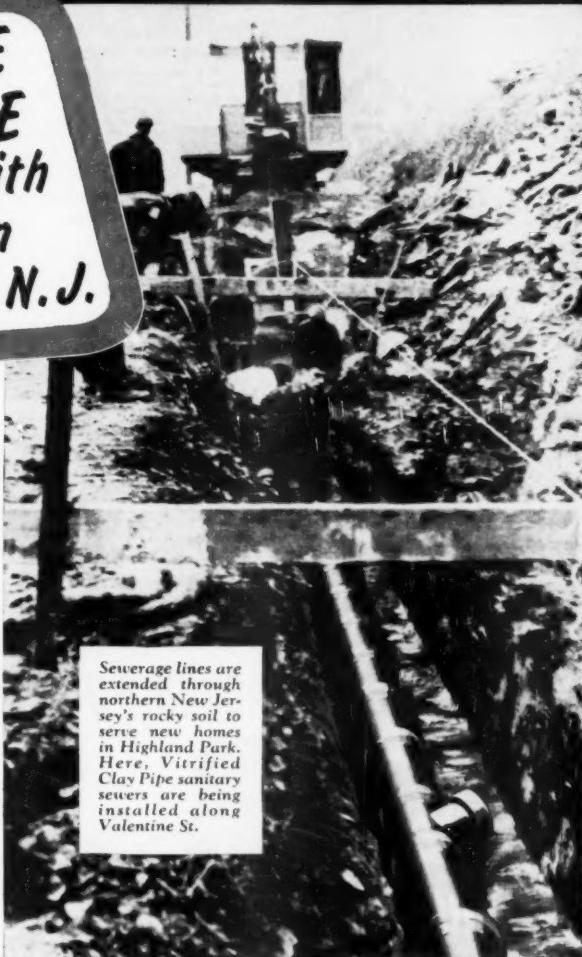
**FRINK
SNO-PLOWS**

CLAY PIPE—ESSENTIAL • ECONOMICAL • EVERLASTING

**CLAY PIPE
SEWERAGE**
*keeps pace with
expansion in
Highland Park, N.J.*

Highland Park, in New Jersey's booming Middlesex County, is rapidly expanding as defense workers move in to man a score of new plants in the area. Industrial employment in the county has jumped 127% in the last decade—10% in the last year—and more than 60% of the area's plants are engaged in defense production. As new homes go up, readily-available Clay Pipe is installed to assure residents the finest sanitary facilities. The acid soils, sewage gases, and other corrosives that cause ordinary pipe to fail have no effect on Vitrified Clay. It's the *only* chemically inert pipe that has proven its worth by years and years of performance in the ground. Its protection is permanent... its economy is sound. *It never wears out!*

NATIONAL CLAY PIPE MANUFACTURERS, INC.
703 Ninth & Hill Bldg., Los Angeles 15, Calif.
100 N. LaSalle St., Rm. 2100, Chicago 2, Ill.
206 Connally Bldg., Atlanta 3, Ga.
311 High Long Bldg., 5 E. Long St.,
Columbus 15, Ohio



Sewerage lines are extended through northern New Jersey's rocky soil to serve new homes in Highland Park. Here, Vitrified Clay Pipe sanitary sewers are being installed along Valentine St.

Vitrified

CLAY
PIPE



WHEREVER RELIABLE, PERFORMANCE-PROVED PIPE IS
NEEDED, SPECIFICATIONS CALL FOR VITRIFIED CLAY

Morrisville, Pa. (New Steel Defense Plant)	300,000 ft.
Bakersfield, Calif. (Air Force Base)	196,000 ft.
Marion, N. C. (Municipal Expansion)	32,000 ft.
Rapid City, S. D. (Air Force Base)	54,000 ft.
Limestone, Maine (Air Force Base)	65,000 ft.
Tucson, Ariz. (Air Force Base)	440,000 ft.
Panama City, Fla. (Municipal Expansion)	450,000 ft.
Rantoul, Ill. (Chanute Field)	158,000 ft.

C-952-4

Get full details of this month's new products... mail your Readers' Service card today.

To order these helpful booklets check the coupon on page 40.

How to Save Time on Curb and Gutter Work

213. Every type of curb and gutter work is illustrated in the 12-page Heltzel catalog on steel forms for building concrete curbs, gutters and sidewalks. Time-saving setups show how to speed up the job and save money. Get your copy from Heltzel Steel Form & Iron Co., Dept. PW, Warren, Ohio.

Be Sure To Investigate The Be-Ge Trencher

171. Municipalities and contractors both report that the Be-Ge trencher with its fully hydraulic operation and easy maneuverability, cuts costs and brings profits on all types of trenching jobs. "Hydraspeed" fluid motor delivers smooth, positive power at any creen speed. Digs up to 24" wide and 5 ft. deep. Hydraulically controlled backfiller blade is standard equipment. Get form 320 from Be-Ge Mfg. Co., Gilroy, Calif., by checking the handy coupon.

Permanent Street Signs

Cut Maintenance Costs

218. Permanent cast aluminum street signs and markers of all types are described in a 20-page illustrated bulletin available from Lake Shore Markers, 654 W. 19th St., Erie, Pa. Get full information on these distinctive markers, available in plain or reflectorized finish, by checking the coupon.

Tractor-Mounted Backhoe

Simplifies Digging Operations

238. Be sure to investigate the new Henry Backhoe to cut digging costs on laterals foundations, septic tanks, etc. Easily attached to your tractor. Get full data from Henry Mfg. Co., 1752 N. Clay St., Topeka, Kansas, by using coupon.

Choosing Trucks

For Municipal Service

264. For all municipal services, trucks needed are those that are high in efficiency and economy. Be sure to investigate the White 3000, engineered for high performance. Full details on White Super Power trucks from the White Motor Company, Cleveland 1, Ohio.

Get the Facts on The Contact Aeration Process

94. Full engineering details on the submerged contact aeration process of sewage treatment, including diagrams of plant units, area requirements, operating costs and other details are available in a bulletin of the Hays Process Co., Box 768, Waco, Texas. Check the coupon to get the facts.

Forms for Every Concrete Pipe Shape

95. In addition to this a complete line of forms for standard concrete sewer and drainage pipe, special forms for varied shapes of every type are listed in the Quinn Concrete Forms Catalog. Copies available by checking the coupon, or write direct to Quinn Wire and Iron Works, 1621 12th St., Boone, Iowa.

Design Data for the Spiraflo Clarifier

124. Be sure to investigate the advantages of the Spiraflo clarifier for sewage treatment. Full engineering data, description of the unit, test results and specifications are offered in 24-page Bulletin 122 by Lakeside Engineering Corp., 222 W. Adams St., Chicago, Ill. Check the coupon today.

All-Electric Floatless Liquid Level Control

174. Description of operating principles and applications of B/W controls show the simplicity and many uses of these all-electric, floatless devices. Get latest bulletin on engineering data, diagrams of typical installations and details of component parts. Check the coupon or write B/W Controller Corp., Dept. PW, Birmingham, Mich.

Have You Investigated Aluminum Gratings?

200. Aluminum gratings for walkways, bridge decking, and stair treads save weight, resist corrosion and are easily handled. Get complete design data, including safe load tables, standard panel widths and weights, from Irving Subway Grating Co., 50-53 27th St., Long Island City 1, N. Y. Just check the handy coupon.

DIG CLEANER TRENCHES...FASTER...with a



Mobile, maneuverable and fast, the BE-GE Hydraspeed digs trenches more profitably . . . whether you have miles of trench to dig at one location . . . or have to move from one small job to another. Self-propelled! Hydraulic controls at operator's fingertips! The exclusive Hydratrans is a positive displacement fluid motor that drives the rear tractor wheels. BE-GE's smoother operation insures cleaner trenches up to 24" wide and 5 ft. deep at speeds from 0 to 12 ft. per minute.

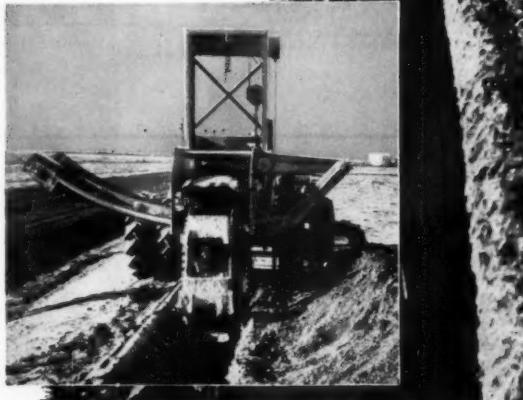
For full details and specifications, see your

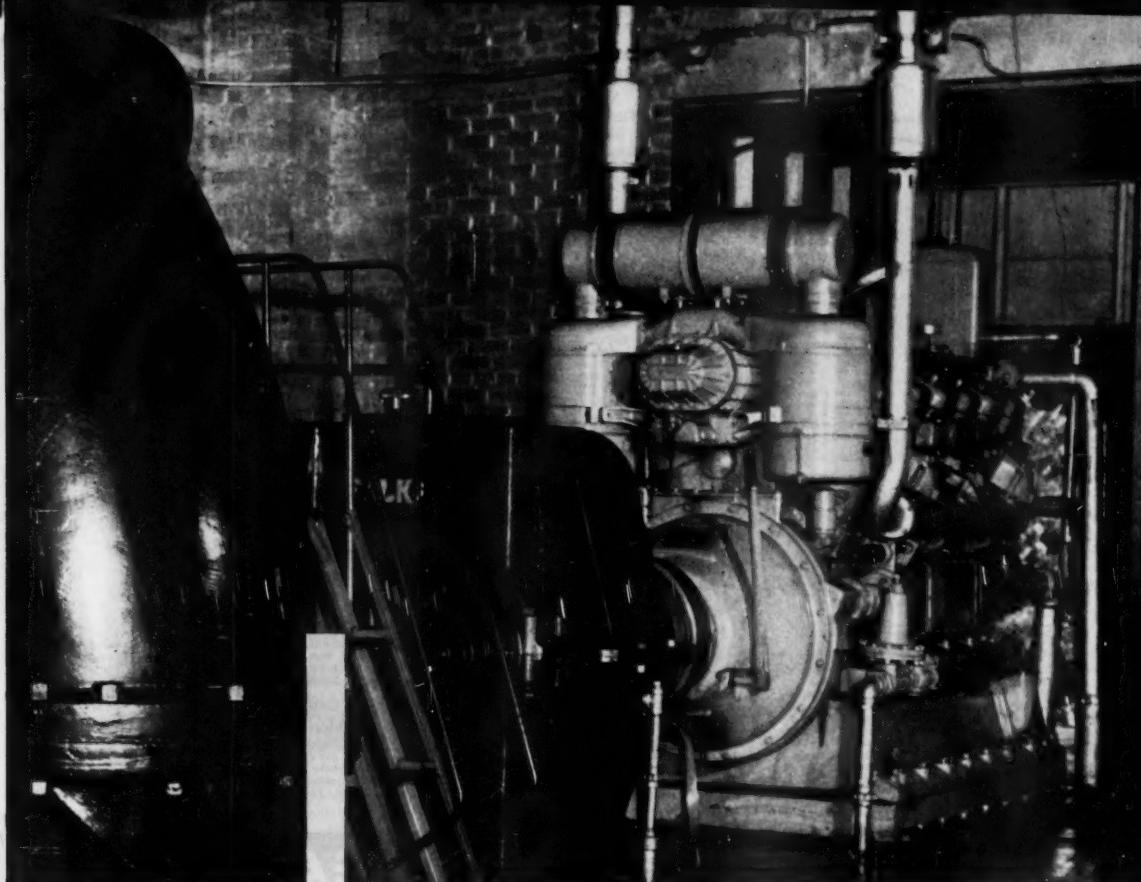
J. I. CASE Industrial DEALER

or write direct to Dept. C

Be-Ge Manufacturing Co.
GILROY, CALIFORNIA

A Northwestern Kansas oil field pipeline contractor reports his Be-Ge dredge/trencher averaged 1,300 ft. of 34" deep, 22" wide trench per day, a lot of it in rough, rocky soil. When picture was taken his Be-Ge had dug over 160,000 feet of trench.





RIDIN' HERD ON OL' MAN RIVER

In Henderson County along the Illinois bank of the Mississippi, most of the 22,400 acres in Drainage Districts No. 1 and No. 2 are low-level, flat farmland. Rain water from surrounding terrain spills into the area. Sometimes there's seepage from the levees along the river. And always, of course, there's the possibility of a flood damaging the valuable corn, soybean, wheat and oat crops.

To handle this problem a pumping station was built near Carman, Ill., in 1913. Its two 48" Buffalo pumps were powered at first by steam, but when operating costs jumped too high electric power was tried. It also proved too expensive. Then, in 1939, four

"Caterpillar" D17000 Diesel Engines were installed. They immediately cut operating costs by two-thirds.

Recently pump capacity was stepped up. "Cat" Diesel power was called on again. This time, two D397 Diesel Engines were put in to drive the two pumps which discharge 100,000 g.p.m. each. These D397 Diesel Engines deliver 400 HP each at 1,000 r.p.m.,

running 24 hours a day. They were easy to install, and they provide the extra pumping power needed to ride herd on the slowly rising river level.

"Caterpillar" Diesel Engines run up to 500 HP. Your "Cat" Dealer can help you with your pumping problem. He's a good man to see wherever dependable power is needed.

CATERPILLAR, PEORIA, ILLINOIS

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES
TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

To order these helpful booklets check the coupon on page 40.

Valuable Booklet on Porous Diffuser Plates and Tubes

21. A helpful 20-page booklet published by the Norton Co. is a complete guide for the selection of porous media for installation in activated sludge plants. Full data for the designing engineer is provided by careful detailing of physical characteristics of plates and tubes. Maintenance of porous media also is discussed at some length. For your copy of Form 1246, write to the Norton Co., Dept. PW, Worcester 6, Mass., or use the coupon.

How Cities Clean Sewer Lines From Street in One Operation

23. In a helpful 28-page handbook of sewer cleaning methods and equipment the makers of OK Champion sewer cleaners give full details of power and hand operated models. Also included are data on expansion buckets that can lift dirt and debris from the sewer operation, root cutters and other accessories. Get your copy by checking coupon. Champion Corp., 4752 Sheffield Ave., Hammond, Ind.

Engineering Data on Digester Heating

23. An excellent 32-page bulletin covering all features of the self-contained heater and heat exchanger unit discusses efficient digester heating, site of heater and exchanger, space requirements, building heating, and related items. Curves and tables provide full data for the designer. Requests for this comprehensive bulletin, No. 235, must be sent on business letterhead. Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago 13, Ill.

Complete Catalog for Engineers Shows Water and Sewage Plant Equipment

19. The complete line of Jeffrey equipment for treatment of water, sewage and industrial wastes is covered in 52-page Catalog 833. Detailed information is provided on bar screens, grinders, grit collectors, "Jigrit" waste removal, filter presses, sedimentation tanks and other related units. Photos and drawings of installations plus capacity tables complete this valuable booklet. Use coupon or write Jeffrey Mfg. Co., 947 N. 4th St., Columbus 16, Ohio.

How Vacuum Filters Help Your Sewage Sludge Disposal

20. Applications of the Conkey sludge filter to all types of sewage sludge are described in Bulletin 100. Tables show filter sizes, weights, and give anticipated average results. Use the coupon to order your copy. General American Transportation Corp., Process Equip. Div., New York 17, N. Y.

Efficient Blowers for Activated Sludge Plants

23. Many advantages of Roots-Connerville positive displacement rotary blowers are described in Bulletin 22-23-B-13, which also provides characteristic curves for operation with constant speed, multi-speed and variable speed motors and details several types of blowers. Get this helpful bulletin by checking the coupon. Roots-Connellyville Blower Corp., Connerville, Ind.

Design Data on the Circuline Sludge Collector

23. All the information you need for the design of circular settling tanks using the Link-Belt Circuline sludge collector will be found in 20-page Book No. 1982, published by Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa. Capacity tables, suggested sizes for all piping and design details are included. Check the coupon for your copy of this valuable booklet.

Vacuum Filters Feature Easy, Non-Clog Operation

24. Get full data on vacuum filters using double layers of continuous coil springs that insure continuous, non-clog operation. Coils are automatically cleaned at each revolution. Komline-Sanderson Engineering Corp., Peapack, N. J.

Book Tells How to Control Root Stoppages

24. Details on the proven use of copper sulfate to control root and fungal growths in sewers are contained in a brand-new book published by Phelps Dodge Refining Co., 40 Wall St., New York 5, N. Y.

Air for Activated Sludge and Other Aeration Processes

187. Quiet operation, high efficiency and compact size are features of the Chicago "Standardaire" positive displacement blower. Wide range of capacities available to fit your needs. Details and performance data from Chicago Pump Co., 622 Diversey Pkwy., Chicago 14, Ill.

Improved Clarification with Carter Circular Clarifiers

189. Complete data and specifications on Carter's three types of clarifiers for sewage treatment, water purification and industrial waste treatment are given in Bulletin 4906 published by R. B. Carter Sales, Inc., Hackensack, N. J. Check the coupon for this valuable working guide.

General Catalog on Measuring and Controlling Equipment

272. The full line of Simplex equipment for the measurement and control of liquids and gases in water and sewage plant installations is illustrated and described in detail in 28-page Catalog 4002. Every engineer should study the design data in this helpful booklet. Write Simplex Valve & Meter Co., 68th & Uplands Sts., Philadelphia 42, Pa., or use the coupon.

How to Dispose of Sewage and Industrial Sludges

281. Get full information on the C. E. Raymond System of combined incineration and sludge drying providing high temperature deodorizing for nuisance-free sludge disposal. Flexible layouts fit large and small communities. Use handy coupon or write Combustion Engineering-Superheater, Inc., Flash Dryer Div., 200 Madison Ave., New York 16, N. Y.

Helpful Design Data On Circular Filter Walls

299. Full design data covering outside walls for trickling filters constructed of reinforced Armcrete tank blocks will be found in a pamphlet issued by Ayer-McCale-Reagan Clay Co., Brazil, Ind. Check coupon for your copy.

COMPARE THESE *Tri-Line* FEATURES BEFORE YOU BUY ANY CONCRETE SAW!

NEW SAVINGS IN MAINTENANCE AND CONSTRUCTION FOR Cities, Counties, States, Utilities, Industries, Airports

Sawing eliminates spalling and resultant after-maintenance costs on repairs—provides highly superior contraction joints on new pavements at lower cost. The nine engineering features indicated below illustrate the reasons why Tri-Line Concrete Cutters are the choice of leading contractors, utilities, street and highway officials, and others. Prove to yourself how Tri-Line outperforms on any concrete sawing job. A demonstration will be arranged without obligation.



Wedge-type cut eliminates spalling and settling in highway repair and underground services.



Cutting provides superior contraction joints at lower cost, permits laying concrete in long sections without interruption.



Floor cutting in industry for machine installation.

CONCRETE CUTTERS



Write for FREE Illustrated Brochure
Complete specifications, construction details and the name of your nearest Tri-Line Dealer available on request.

Dealer Inquiries Invited!



Double-ended arbor for right or left hand cutting.
Exclusive 3-wheel undercarriage eliminates biting and blade wear.

Manufactured by
TRI-LINE COMPANY
929 Carroll St.
RACINE, WISCONSIN

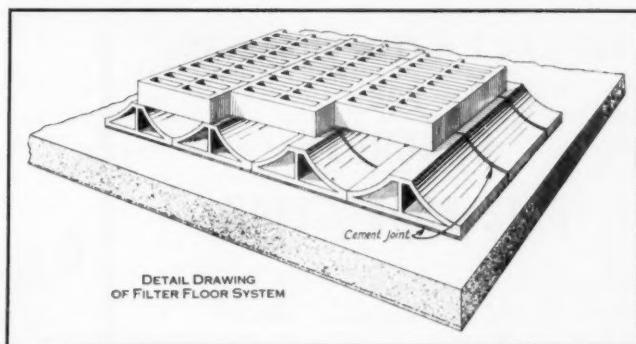
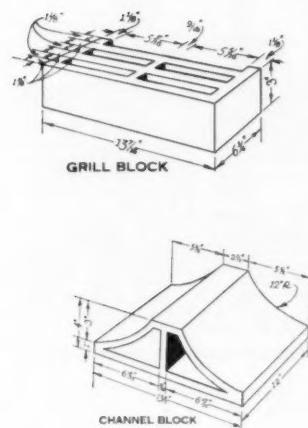
"IMCO"

TWO-UNIT VITRIFIED CLAY
FLOOR SYSTEM FOR
**TRICKLING
FILTERS**



Installed in Two-150 Ft. Filters in the
New Sewage Treatment Plant of Easton,
Pennsylvania.

Glace & Glace,
Consulting Engineers,
Harrisburg, Penna.



The IMCO Two-Unit Vitrified Clay Floor System is meeting the strict requirements of Sanitary Engineers for trickling filter floors. It has been tested over the years and has proven itself to be far superior to anything of its type as to simplicity, cost of construction, and durability.

INDUSTRIAL MATERIALS COMPANY
SOMERSET STREET & TRENTON AVENUE
PHILADELPHIA 34, PA.

The percentage of open area in the top floor for drainage and aeration of the stone media is forty (40%) percent and is as large as can be provided. The grill or top block has a compressive strength of 6000-7000 pounds per square inch, giving maximum safety to the floor during the process of loading the filter stone.

Thousands use our Readers' Service card to keep up to date . . . do you?

PEST CONTROL

Latest Information On Effective Insecticides

198. Complete information on proper application and formulations of Chlordane and other effective insecticides for fly and mosquito control is available from the Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

STREETS AND HIGHWAYS

Use Hot Patch Material On All Maintenance Jobs

297. With the Barber-Greene Mixall you can get hot patch material wherever and whenever you need it for all maintenance jobs. Send for new 8-page bulletin that gives full information on Mixall's unique hot patch material that turns out any quantity you need. Write Barber-Greene Co., Aurora, Ill., or use the coupon.

How the Mobil-Sweeper Can Improve Street Sweeping

33. Sweeping costs can be cut with the new Mobil-Sweeper which features safe highway speeds up to 55 mph, carries 2 2/3 cu. yd. dirt hopper, sweeps swath up to 10' wide with full floating brooms. Hills and deep gutters are no obstacle. Write to The Conveyor Co., 3260 E. Slauson Ave., Los Angeles 38, Calif., or use coupon for complete details on this machine.

Helpful Installation Manual For Drainage Structures

62. A 46-page manual, well worth careful study by designers and field engineers dealing with drainage structures, culverts, sewers or

To order these helpful booklets check the coupon on page 40.

conduits, is offered by Armcro Drainage & Metal Products, Inc., Middletown, Ohio. Proper location of the structures, base preparation, assembly and backfill are some of the many items covered in detail. Use the handy coupon for free copy.

Levels Sidewalks and Curbs Quickly and Easily

29. How the Mud-Jack Method for raising concrete curb, gutter, walks and streets solves problems of that kind quickly and economically with the usual cost of time-consuming reconstruction activities—a new bulletin by Koehring Company, 3026 W. Concordia Ave., Milwaukee 10, Wis.

Get Data Now On This Catch Basin Cleaner

34. Simple powerful pneumatic bucket is featured by Netco Catch Basin Cleaner. Folder 33A gives details and illustrates operation of complete self powered truck mounted unit. Netco Div., Clark-Wilcox Co., 118 Western Ave., Boston 34, Mass.

Your Dump Truck As a Complete Working Unit

39. The addition of a Holmes-Owen Loader to four dump truck converts it into a complete digging and loading unit that enables one man to load, haul and dump. Illustrated folder shows how the self-loading unit will save valuable crowding time and labor. Check the handy coupon for full data. Ernest Holmes Co., Chattanooga, Tenn.

Do You Have Complete Black Top Equipment Data?

41. In 36-page catalog AA a full line of maintenance is covered. Units described and illustrated include several models of pressure distributors, supply tanks, sprayers, brooms, asphalt kettles, portable rollers, and accessory tools. Use coupon for copy of this handy manual. Littleford Bros., 452 E. Pearl St., Cincinnati 2, Ohio.

Excellent Booklet Shows Aerial Mapping Technique

27. A clear explanation of the technique of aerial topographic map production is given in "Air Speeds Your Map Needs." Striking photographs trace aerial photos step-by-step to the final maps for highway location, city and regional planning, pipeline planning, traffic studies, drainage and watershed projects, tax maps and many other types of work. Use the coupon to get this excellent booklet for public works and planning officials. Jack Ammann, Photogrammetric Engineers, 829 N. St. Mary's St., San Antonio 2, Texas.

Clean Cuts For Concrete and Blacktop

98. Quick, efficient cuts in pavement for repair and installation of underground utilities are easily made with the Tri-Line concrete cutter. It cuts clean edges of cuts preventing splitting of the replaced pavement. For all details on the Tri-Line cutter and double-bonded diamond blades get form 500A from Tri-Line Bros., 921 Carroll St., Racine, Wis. Just check the coupon.

Sweepings Rehandling Eliminated By Detachable Hopper

100. Be sure to investigate this new method for cutting street sweeping costs by use of Dempster-Dumpraster detachable hopper in combination with Elgin sweeper. Hand loading of sweepings eliminated since hydraulic controls lift hopper in place on sweeper; quickly replace full hopper with empty one to save sweeper travel time. No unsightly piles of dumped sweepings. Full details in Folder 1104, available by checking coupon. Dempster Bros., Inc., Knoxville, Tenn.

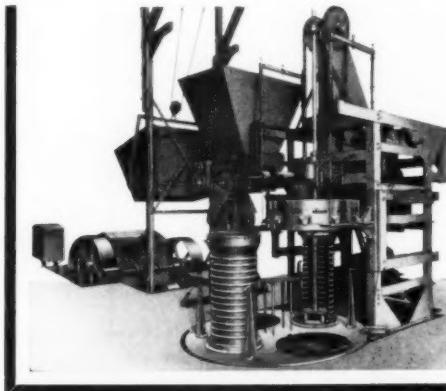
Black-Top Paver Offers Many Advantages

150. The flexible Admum Black Top Paver lays any asphalt mix, hot or cold, in widths from 6 ft. to 13 ft. Careful design lowers operating cost and cuts maintenance. Attachments spread stone, cinders or slag. Get full data on this machine by checking coupon. The Foote Co., 1934 State St., Nunda, N.Y.

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- 1) Doubles production in all sizes 4" to 36".
- 2) Handles 90% of suburban market — 80% of metropolitan market.
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There are several reasons why Chlordane continues to grow in popularity in municipal insect control programs. As a contact insecticide Chlordane kills those flies and mosquitoes which it touches. When ingested, however, Chlordane and its residues are active stomach poisons. Chlordane is completely soluble in petroleum products normally employed as carriers and diluents.

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write directly to the
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with motorcycle spray unit

Photographs courtesy of Desplaine River Mosquito Abatement Authority, Chicago Tribune, Chicago Sun.

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Bell Joint Clamp for
stopping bell and
spigot joint leak
under pressure. Gasket
is completely
sealed; at bell face
by Metal Metal Seal
band—at spigot by
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gasket lip.

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15 minutes. Gasket
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216. The Bucyrus-Erie "Hydro-hoe", a completely hydraulic dragshovel has two separate digging actions to dig a level, scallop-free trench and greatly reduce hand trimming. Be sure to investigate this rugged, easily operated machine. For details write Bucyrus-Erie, Hydromine Div., So. Milwaukee, Wis., or check the handy coupon.

Latest Data on Rubber Roads

296. A new report covering all developments to date on the use of natural rubber in road surfacing of asphalt highways has been issued by the Natural Rubber Bureau, 1631 K St., N. W., Washington 6, D. C. Get your copy of this 52-page booklet which includes new data on research and full reports on test roads in many states. Use the handy coupon.

Hot or Cold Patching Mixtures Prepared on the Job

304. By preparing your patching mixtures, hot or cold, right on the job, you can use them immediately—minimum of handling. Get full data on the McConaughay Model HTD "Multi-Pur" Asphalt Mixer for fast, easy and economical preparation of patch materials. Write K. E. McConaughay, Lafayette, Ind. or use the coupon.

WATER WORKS

Is Your City Metered 100%?

33. 100% metering as practiced by many cities requires accurate, dependable meters with interchangeable parts. Cut-away views of every part, capacity and size data are all included in handsome American-Ningara water meter booklet available from Buffalo Meter Co., 2920 Main St., Buffalo 14, N. Y.

Efficient Underdrains for Rapid Sand Filters

59. Be sure you have engineering data on glazed fire clay tile filter bottoms, designed for efficient filtering and backwashing. Get the coupon or write F. B. Leopold Co., Inc., Dept. PW, 2413 W. Carson St., Pittsburgh 4, Pa.

Bulletin Helps Specify A.W.W.A. Valves

64. All the facts you need to know when designing, ordering or specifying A.W.W.A. valves will be found in Bulletin 106, issued by Kennedy Valve Mfg. Co., Elkhorn, N. Y. Detailed specifications are provided on the wide range of types, sizes, controls, accessories and connections available. Check the coupon to get this valuable reference material for your permanent file.

Water Treatment Unit For Small Supplies

87. A complete-package water treatment unit to treat 5 to 100 gallons per minute is described in Bulletin 1845, issued by Infico Inc., Box 5035, Tucson, Ariz. Just what sterilizing, sterilizers or removal of organic matter, tastes or odors. Requires a minimum of attention. Investigate this unit whenever dependable treatment is needed for small domestic supplies. Check the coupon today.

Cement Lining for Smaller Diameter Water Lines

89. Water lines from 4" to 12" diameter are now cement-lined in place by Centrifine Corp., using the Tite process. Catalog C-50 tells how this operation gives new pipe performance to old lines, and shows just how the work is done. An interesting folder, well worth studying. Check coupon for your copy. Centrifine Corp., 140 Cedar St., New York 6, N. Y.

Specs for Gate Valves

112. Rigidly inspected gate valves for pressures up to 175 lbs. by R. D. Wood Co. Sizes 2" to 30"; for any standard type joint. R. D. Wood Co., Public Ledger Bldg., Philadelphia 5, Pa.

Engineering Facts About Transite Pipe

83. This compilation of Johns-Manville's "Engineering Facts" series presents concise, factual information about Transite's many economic and engineering advantages, and includes informative case histories plus dimensions and data for your files. Write Johns-Manville, Box 290, New York 16, N. Y., or use the handy coupon.

Useful Data on Butterfly Valves

100. Complete descriptions and tables of dimensions on the full line of Rockwell Butterfly Valves is contained in several bulletins published by the company. Construction details and special control features are illustrated. Write W. S. Rockwell Co., 200 Eliot Street, Fairfield, Conn.

Tested Jointing Materials

102. "Hydroite" is a self-caulking, self-sealing joint compound for bell and spigot pipes. For data book and sample write Hydroite Development Corp., 50 Church St., New York, N. Y.

Pressure Pipe That Retains Capacity

106. Several bulletins describing the construction of pressure pipe, list of installations, carrying capacity tests, making service connections under pressure, and detail descriptions of several installations. Lock Joint Pipe Co., Box 269, East Orange, N. J.

Pipe Detector Determines Exact Location and Depth

129. Determination of the exact location and depth of buried pipes, valves, service cables and other metallic objects can save costly digging and unnecessary damage. Your work can be speeded when you use the Detectron pipe detector, which features simple operation, shielding to avoid static interference, economical site construction and a lifetime guarantee. Get full data from Detectron Co., 5631 Cabuenga Blvd., No. Hollywood, Calif., by using the coupon.

How Your Filter Washing Can Be Improved

136. More thorough sand washing with the elimination of mud balls and cracking with resultant longer filter runs are claimed for the Palmer Filter Bed Agitator, described in bulletin issued by the Palmer Filter Equipment Co., P. O. Box 1655, Erie, Pa.

Sewer and Water Pipe Cleaning Service Can Save You Money

149. Your sewers and water pipes will be cleaned by experienced crews using modern, mobile equipment. Learn how you can advantage of the fast, efficient service offered by Ace Pipe Cleaning Contractors, Inc., Kansas City, Mo. Don't neglect proper sewer sanitation or clogged water lines; let specialists do the job for you. Make a start today by getting the profusely illustrated bulletin which describes the Ace services. Check the coupon now.

Helpful Data on Corporation Stops

161. A complete line of brass goods for water works: corporation stops, curb stops, service pipe couplings, goosenecks and other fittings are illustrated and described in catalog W-39, issued by A. Y. McDonald Mfg. Co., Dubuque, Iowa. Get your copy for ready reference.

Have You Investigated Plastic Pipe?

165. Yardley plastic pipe is available up to 6" in standard pipe sizes plus lightweight rigid and flexible types. All Yardley pipes are non-toxic and highly resistant to chemical action and corrosion. Folders describing each type are available from Yardley Plastics Co., 142 Parsons Ave., Columbus 15, Ohio.

What You Should Know About Meter Setting and Testing Equipment

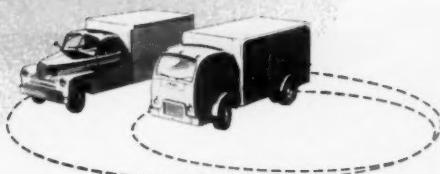
166. Complete details on all equipment and proper methods for meter testing and installation are included in an excellent book published by Ford Meter Box Co., Wabash, Ind. All waterworks men concerned with setting and testing of water meters should have a copy of this book. Write for Catalog No. 50.

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TAILORED to your exact work, the White 3000 makes savings in manpower and time never before possible in public service operations.

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NOW fast easy reaming with the new RIGID 2-S Spiral

- ★ Reams pipe fast, easily and cleanly.
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Reamer unit sold separately—fits your RIGID OOR threader handle

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Pipe Joint Essentials and Couplings for Every Job

168. Superior pipe joints are tight, flexible, simple, strong and economical. Dresser's handsome 34-page bulletin No. 513 shows how these essentials are met and provides layouts for curves, working pressures and a wealth of other data. Be sure to check this bulletin on the coupon. Dresser Mfg. Div., 39 Fisher Ave., Bradford, Pa.

On Mechanical Joint C.I. Pipe Engineering Data

183. General specification, weights and dimensions of mechanical joint cast iron pipe and fittings are furnished in a 32-page booklet issued by Alabama Pipe Co., Anniston, Ala. Get this helpful data by checking coupon.

Complete Catalog and Reference Data on Valves and Fittings

211. The entire M & H line of valves, fittings and accessories for water works, filtration, sewage disposal and fire protection are illustrated and fully detailed in Catalog 52 issued by M & H Valve & Fittings Co., Anniston, Ala. In addition to complete data on these products, there are many pages devoted to helpful engineering data. Every designer should have a copy. Get yours by checking the coupon.

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224. Dependable Climax power plants are ready for emergency service to insure fire protection, and can also save power costs by peak load generation. Write the coupon for data on Climax 40 to 495 HP, operating on sewage or natural gas, butane or gasoline. Climax Engine & Pump Mfg. Co., 208 So. La Salle St., Chicago 3, Ill.

How to Make Fluoride Determinations

244. Information on the Hellige Aqua Tester for precise fluoridation control in the range from 0 to 1.6 ppm fluoride is available from Hellige, Inc., 877 Stewart Ave., Garden City, L. I., N. Y., by using coupon.

Design Data for Hardness, Turbidity, Color or Algae Removal

252. Bulletin No. 9041 published by The Dorr Co. furnishes design data on the Hydro-Treater for high-rate, upflow type treatment of municipal and industrial water supplies. 32 pages include distinguishing features of the unit, types and sizes, capacity ratings and typical operating results. Get your copy of this helpful bulletin by using coupon today. The Dorr Co., Barry Pl., Stamford, Conn.

All About Centrifugal Pumps

258. Where pumping performance counts you want to check your specifications carefully. Investigate the features of Fairbanks-Morse centrifugals. Use coupon or write to Fairbanks, Morse & Co., Dept. PW, Chicago 5, Ill.

Gauges for Good Filter Plant Operation

275. Mechanically operated filter gauges for indicating and recording loss of head, rate of flow, sand expansion and other data needed for good filter plant operation, are described in Bulletin No. 450-H10, issued by Builders-Providence, 356 Harris Ave., Providence 1, R. I. Besides details on the gauges themselves, typical installations are shown. Check coupon for your copy.

Standard Specifications for C. I. Pipe and Fittings

278. Standard dimensions for cast iron water pipe and special castings are available in a convenient booklet offered with the components of U. S. Pipe and Foundry Co., Burlington, N. J. Get your copy by checking the coupon.

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280. Steel pipe lines, elevated tanks, treatment plant equipment and all other steel structures subject to external corrosion and attack by aggressive soils can be protected by long-lasting Bitumastic enamels. Send for bulletins today so that you can specify the right coating for your job. Use coupon or write Koppers Co., Tar Products Div., Dept. 555T, Pittsburgh 15, Pa.

New TRUCK LOADER**CUTS COST of Many OPERATIONS****For these CITIES →**

The time, labor and equipment which users are saving with the new Holmes-Owen truck loader has made this equipment increasingly popular with municipalities as shown by the number of cities now having these units in operation.

The versatile one-man operation of this hydraulically operated unit permits the truck driver to do his own light digging, grading, loading and cleaning up . . . without the need for additional manpower or the use of more costly equipment. Loading, hauling and unloading is therefore handled faster, more efficiently and at a substantial reduction in cost. The loader lifts $\frac{1}{2}$ yard per bucket, loads average truck in 4 minutes and can be installed on most $1\frac{1}{2}$ to $2\frac{1}{2}$ ton trucks. Ask your equipment dealer for details or write factory direct.

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To ensure low power rates for towns-people, this 12-cylinder Hamilton diesel will soon go into service in Decatur, Ind. Over 60 feet long, it will be one of the largest single-acting units ever erected in this country.

Designed to produce 5,880 hp, this big $21\frac{1}{2} \times 27\frac{1}{2}$ engine will give a net output of 3,810 kw. Unusual efficiency features—plus use of inexpensive Bunker C fuel oil—will give *low* operating costs.

SQUISH ACTION! There's a reason for this economy. In a Hamilton diesel, an *exclusive* rotary valve, an annular wall chamber and a semi-hemispherical combustion chamber trap 40% more air in the cylinder.

This extra air is *squished* into the fuel spray cone just as the cylinder approaches top dead-center. There's complete, efficient combustion—more power—less engine wear—less maintenance—cleaner, cooler exhaust.

WRITE TODAY! Remember there's a conservatively rated Hamilton or Baldwin-De La Vergne diesel for virtually any job in the slow and medium-speed range from 550 to 6860 hp.

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**Plant Operators are all talking
about the Low Maintenance Costs**

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DORR CLARIFIERS

And the talk is based on *fact* . . . actual studies of Dorr Clarifiers in operation over a period of years.

For example, look at Cleveland, Ohio's

Easterly Treatment Plant — where sixteen 112' dia. Dorr Clarifiers have been in operation since 1932. The figures below are based on actual and accurate plant records — and they're typical of the kind of repair costs you can expect with Dorr units.

Repair costs are one of the primary factors upon which Clarifier excellence should be judged. Are you getting the best?

We'd like to tell you how Dorr Clarifiers stack up on performance too. Ask a Dorr Engineer for the facts.



16 Dorr Sifeed* Clarifiers, for handling 123 M.G.D. of activated sludge at Easterly Treatment Plant, Cleveland, Ohio.

*Reg. U.S. Pat. Off.

13-Year Repair Cost Record for 16 DORR Clarifiers

Years of Operation	13
Total Repair Cost	\$848.83
Repair Cost per unit	\$ 53.05
Repair Cost, per unit, per year	\$ 4.08
% of Original Cost spent for all repairs in 13 years	0.6%



Better tools TODAY to meet tomorrow's demand

D O R R

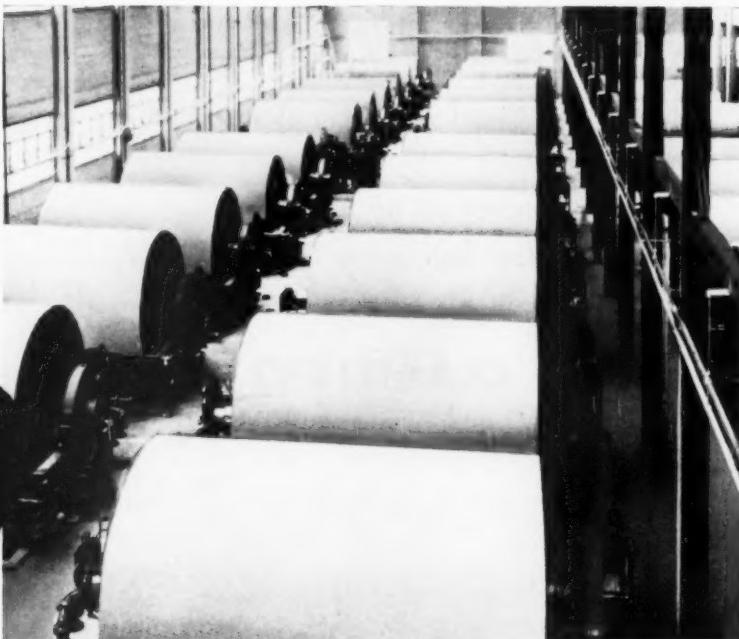
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*Designed
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66 Conkey Sludge Filters now installed in one plant of Chicago Sanitary District

The West-Southwest Treatment Works of the Chicago Sanitary District is the largest sewage treatment plant in the world. Here, the huge volume of industrial and residential waste from the heavily populated metropolitan area has presented sewage engineers with an unparalleled challenge. Progressively, the Chicago Sanitary District has met that challenge. Starting twenty years ago with installations of continuous vacuum filters for activated sludge, Sanitary District engineers have developed the most exacting specifications and rigid requirements for filter designs and performance... culminating in the installation of 66 Conkey Rotary Drum Vacuum Filters for this largest single installation in the sewage field.

These Conkey units incorporate:

Polystyrene plastic cloth backing drainage plates for long cloth life and low maintenance.

Flotating cake discharge scraper.

Protective coatings for filter components.

— and other superior design and construction features.

For equivalent Conkey design and fabrication for your filter installation, write General American. Ask for bulletin No. 100 or for a consultation with one of our engineers.

**Other General
American Equipment:**
Turbo-Mixers, Evaporators,
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WALLACE & TIERNAN FLUORIDATORS

Wallace & Tiernan is on call to give you the same complete service on fluoridators that it has given on other chemical feed equipment for the past thirty-nine years.

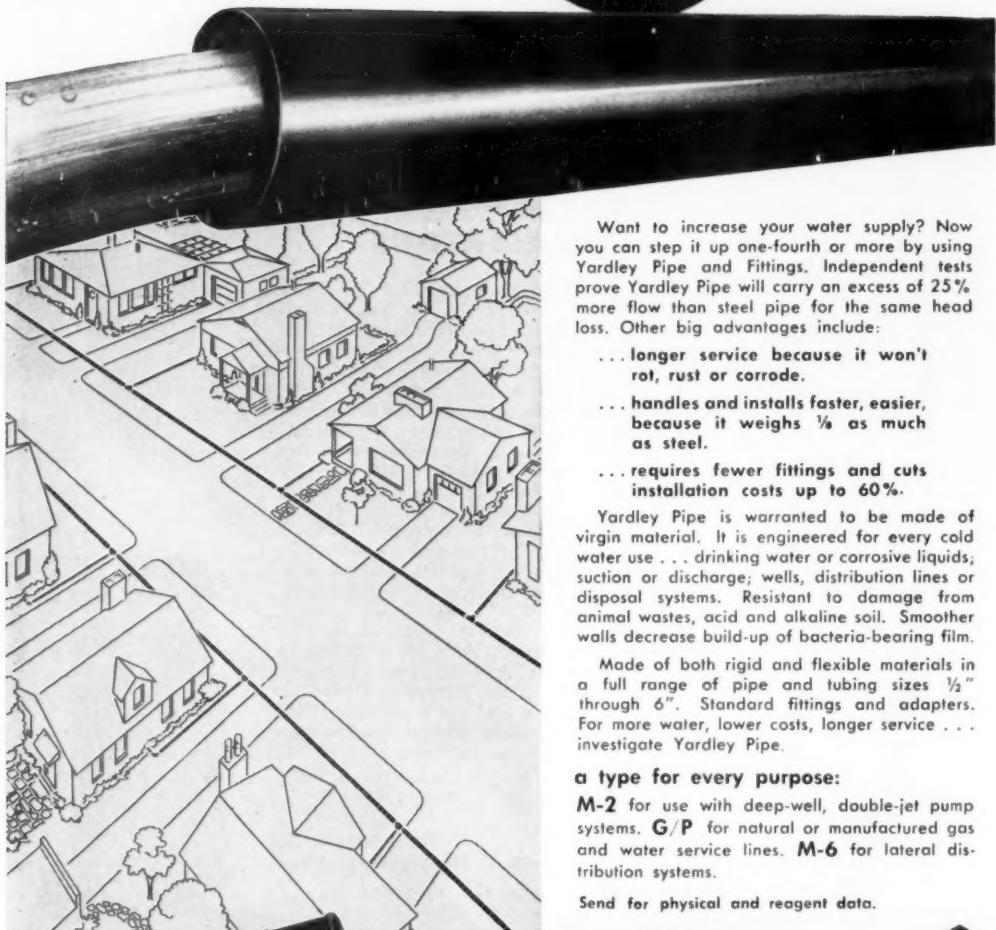
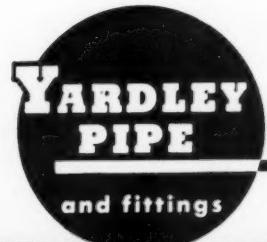
When your community is considering the addition of fluorides, W&T Representatives are prepared to provide you with data on the types of chemicals which may be used, the selection of the point of application, the types of equipment available for feeding fluorides, and other aspects of fluoridation. After the decision to fluoridate has been made, W&T can provide accurate, dependable Fluoridators—especially designed for the exacting requirements of fluoridation. W&T's nationwide, factory trained, service staff is prepared to give prompt service on all W&T Fluoridators to ensure the continuous operation of the fluoridation process. W&T is On Call to serve you—see your W&T Representative for additional information.



W&T's Series A-635
Gravimetric Fluoridator

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**25%
MORE WATER**



Want to increase your water supply? Now you can step it up one-fourth or more by using Yardley Pipe and Fittings. Independent tests prove Yardley Pipe will carry an excess of 25% more flow than steel pipe for the same head loss. Other big advantages include:

- ...longer service because it won't rot, rust or corrode.
- ...handles and installs faster, easier, because it weighs $\frac{1}{2}$ as much as steel.
- ...requires fewer fittings and cuts installation costs up to 60%.

Yardley Pipe is warranted to be made of virgin material. It is engineered for every cold water use . . . drinking water or corrosive liquids; suction or discharge; wells, distribution lines or disposal systems. Resistant to damage from animal wastes, acid and alkaline soil. Smoother walls decrease build-up of bacteria-bearing film.

Made of both rigid and flexible materials in a full range of pipe and tubing sizes $\frac{1}{2}$ " through 6". Standard fittings and adapters. For more water, lower costs, longer service . . . investigate Yardley Pipe.

a type for every purpose:

M-2 for use with deep-well, double-jet pump systems. **G/P** for natural or manufactured gas and water service lines. **M-6** for lateral distribution systems.

Send for physical and reagent data.



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COLUMBUS 15, OHIO

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**New
North
Point
sludge
treatment
plant**

San Francisco,
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C-E Raymond Systems installed, under construction or on order since 1945

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California growers now have a valuable new source of fertilizer — San Francisco's large new North Point Sludge Treatment Plant.

In this plant, three C-E Raymond Flash Drying Units are geared to produce about 100 tons of high-grade, marketable fertilizer every day. This is equivalent to an evaporation rate of 18,750 pounds of water per hour from the filter cake that enters the flash drying units.

The North Point plant serves an equivalent population of 1,400,000 in the San Francisco area. It is typical of C-E Raymond System installations throughout the country, serving the needs of both large and small communities. These installations are flexible, efficient and reliable; they provide for maximum utilization of waste heat.

To see how they can serve your community, too, get in touch with the C-E office nearest you. A flash dryer specialist will be glad to help you find the best solution to your sludge disposal problem.

B-614

**COMBUSTION
ENGINEERING—
SUPERHEATER, INC.**

FLASH DRYER DIVISION

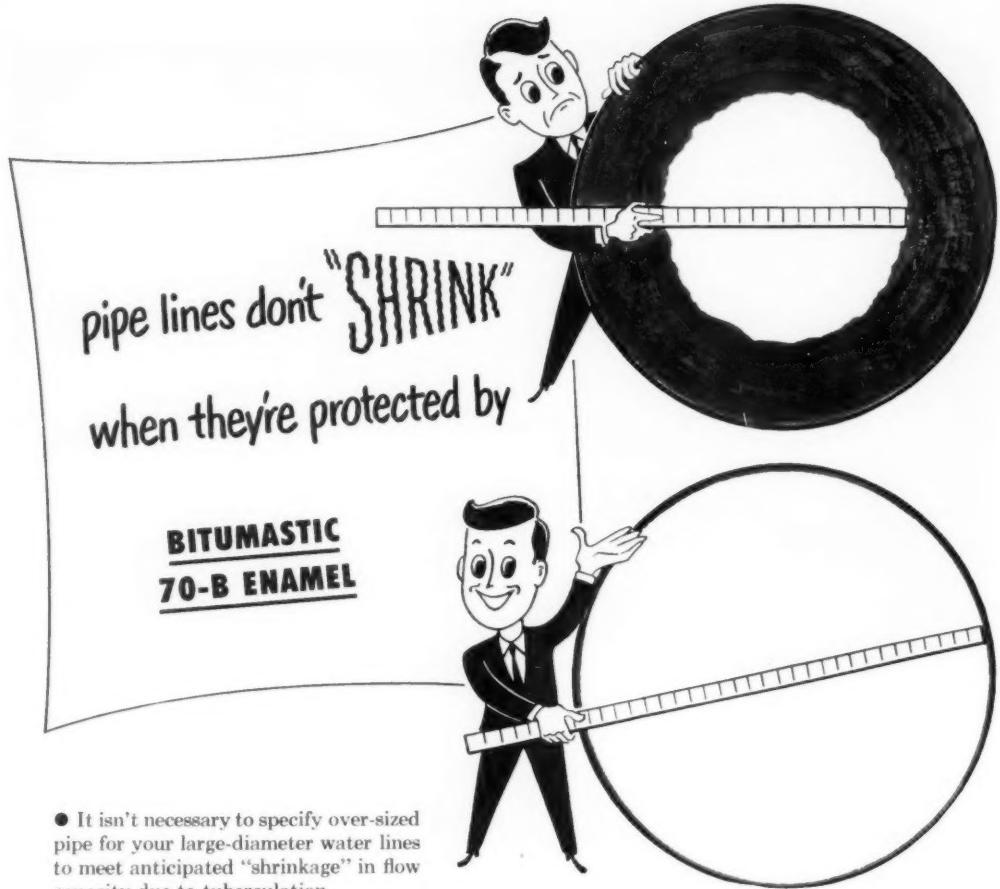
1315 North Branch Street
Chicago 22, Illinois

Western Office: 510 W. Sixth, Los Angeles 14, Calif.
Eastern Office: 200 Madison Ave., N. Y. 16, N. Y.

Industrial sludges a problem?
C-E Raymond Flash Drying and Incineration Systems have been the answer for others. Write for information.



Now's the time to mail this month's Readers' Service card.



- It isn't necessary to specify over-sized pipe for your large-diameter water lines to meet anticipated "shrinkage" in flow capacity due to tuberculation.

It's far less expensive to *prevent tuberculation* by coating the pipe interior with a smooth, spun lining of Bitumastic® 70-B Enamel. Then you can select pipe size solely on the basis of desired capacity.

Bitumastic gives you lastingly-high coefficient of flow that reduces pumping costs . . . results in savings that more than pay the cost of the lining.

Bitumastic 70-B Enamel also makes it unnecessary for you to specify additional wall

thickness to compensate for corrosion. An exterior coating of Bitumastic 70-B Enamel, combined with the spun lining, forms a barrier against all types of corrosion, inside the pipe and out.

Make certain your community is getting its money's worth of proper protection — specify Bitumastic 70-B Enamel for all of your large-diameter water lines.



KOPPERS COMPANY, INC., Tar Products Division, Dept. 1055-T, Pittsburgh 19, Pa.
DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.

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"QUICK-WAY" digging "Bell Hole"



"QUICK-WAY" working in close to the pipe



Workmen sealing off a leak

"QUICK-WAYS" and BELL HOLES

THE SOUTHERN CALIFORNIA GAS CO. makes REAL SAVINGS with 3 MODEL J "QUICK-WAYS"

Used For Speeding Repairs and General Maintenance So Essential in Giving Uninterrupted Service—"QUICK-WAYS" dig "Bell Holes" in the repair of damaged 16" to 26" gas lines—Remove old pipe and lower new pipe—Backfill "Bell Holes" and ditches.

Here Are The Exceptional Savings Reported

1. "QUICK-WAYS" have cut "out of service" time by one-half on jobs they have worked.
2. In exceptionally hard digging where special tools were formerly necessary, the "QUICK-WAYS" have cut the working time three to one and have made one-half the crew available for other jobs.
3. Since the purchase of the "QUICK-WAYS," the "Bell Holes" are dug, pipe repaired and the holes refilled in the same amount of time that it formerly took just to dig the "Bell Holes."
4. A job in the mountains was accomplished by two men and a foreman in four hours which included 82 miles of travel. Before the use of "QUICK-WAYS," this same job on the 22" line took six to eight men four days to complete.
5. The cost of repairing in a "Bell Hole" has been cut in half by using "QUICK-WAYS."
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"QUICK-WAYS" have dozens of uses in numerous types of jobs—handle aggregate, building materials, excavation work, dig ditches, drive pile, pour concrete, set steel, etc. Easy to move from job to job. Eight attachments. Four sizes from 3 to 10 ton crane capacity.

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"QUICK-WAY" backfilling a hole

"QUICK-WAY" lifting 12" x 20' pipe



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"QUICK-WAY" TRUCK SHOVEL CO.
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Mail Coupon Today!

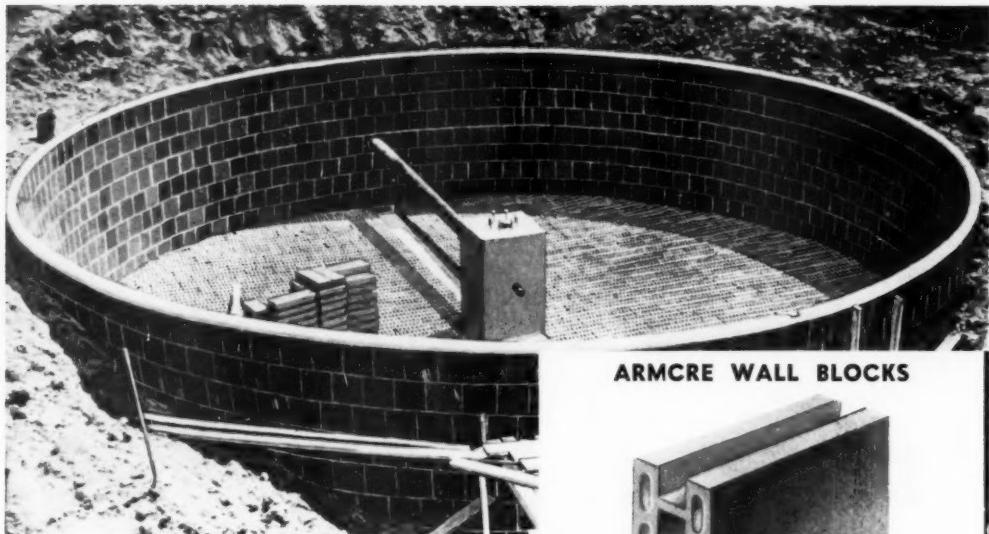
Please send me complete details on "QUICK-WAY" Truck Shovels—four different models from 3 to 10 ton crane capacity.

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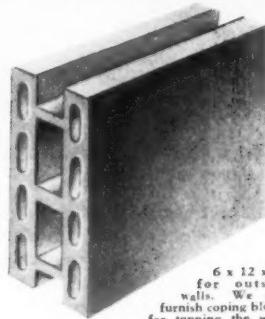
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6 x 12 x 12
for outside
walls. We also
furnish coping blocks
for topping the wall.

*...in DeKalb, Texas,
Trickling Filters it's*
ARMCRE
wall and floor filter blocks

The consulting engineers on the DeKalb job—Wisenbaker, Fix & Associates, of Tyler, Texas—chose ARMCRE blocks for many sound reasons.

Among them, they are engineered and designed for the longest possible trouble-free service and the best flow of effluents. Also, they include ample openings and channel capacity, smooth circular channels for maintaining good velocities. They also have the best ventilating capacity, durability, and economy in construction.

No finer filter blocks made than

ARMCRE
AYER-McCAREL-REAGAN CLAY CO.
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*For further information we refer to ASTM Designation C 159-48T
Specifications for Vitrified Clay Filter Block for Trickling Filters.*

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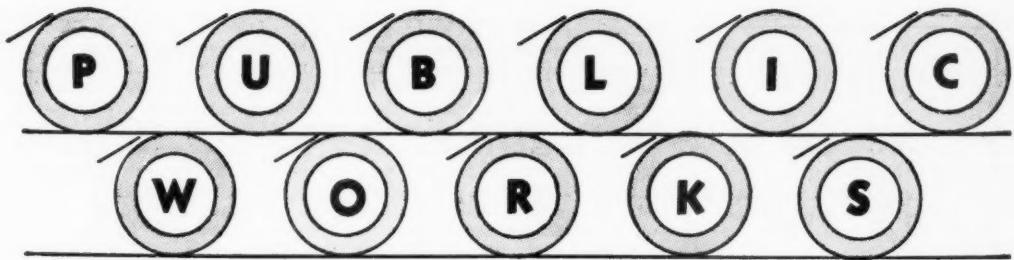
Save 20% on the average in construction costs.
Save Steel for reinforcing other types of construction—a hard-to-get item now.
Improve Appearance No other material gives so attractive a filter wall.
Simple to Use Low construction cost. Exact alignment. Permanency is also an added feature of ARMCRE wall blocks.

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ARMCRE was the first one-piece block manufactured. It was the first one-piece underdrainage block produced that gave engineers 100% efficiency in trickling filters. ARMCRE is nationally and internationally known and has been used in more installations than any other block.

*When you buy ARMCRE you buy the complete
floor.*



Vol. 83 No. 10 • October, 1952

TWO DESIGN FEATURES REDUCE SEWAGE TREATMENT

WALTER F. HICKS, JR.,

Wisenbaker, Fix & Associates,

Consulting Engineers, Tyler, Texas.

TO meet the sewage treatment needs of DeKalb, Texas, a plant was designed which consists of an additional and larger Imhoff tank, a high rate filter, and an oxidation pond with recirculation back to the Imhoff tank. As is many or most small-community problems of this type, the financing of the plant was difficult. In order to keep initial costs as low as possible, two rather unusual design features were adopted: The septum walls of the Imhoff tank were precast and set in place after the tank was constructed; and reinforced vitrified clay tile blocks were used for the walls of the filter.

The existing plant consisted of a small Imhoff tank and a sludge drying bed, which were totally inadequate for present-day conditions. DeKalb has experienced considerable growth in recent years. In 1940, the population was 1,287; in 1950 it was 1,917, with growth continuing at a rapid rate. A tomato canning plant, which operates for about six weeks during the summer contributes a highly acid waste that has been difficult to treat. Attempts to neutralize and stabilize the effluent with lime have not been completely successful. The design population was assumed at 3,000 and the new plant was designed for this loading.

The financial problem was a se-

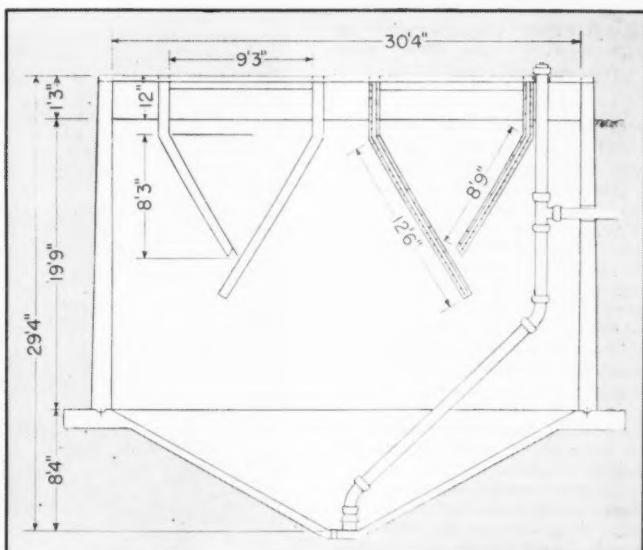
PLANT COST

vere one, even more so than that of the technical design. Extreme difficulty was encountered in obtaining sufficient funds from the sale of water and sewer revenue bonds to finance both the overall water and sewer improvements and the treatment plant. For this reason, economy in design was necessary.

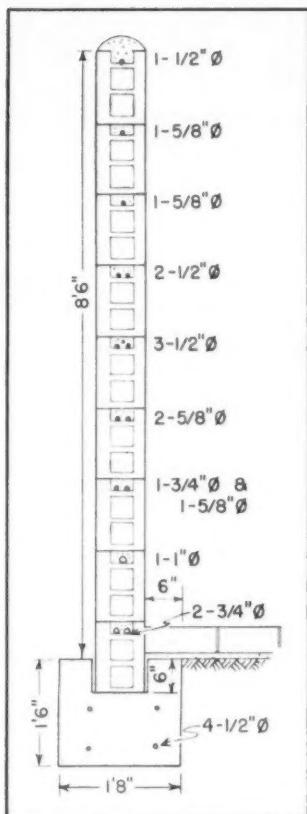
With a design population of 3,000,

and a per capita flow of sewage of 50 gallons per day, the average flow coming to the plant will amount to 150,000 gpd. Peak flow was assumed to be 150% of average, or 225,000 gpd. On the standard basis of 0.17 lb. per person, BOD was determined to be 510 pounds per day and the removal in the settling tanks was assumed at 35%.

To supplement the existing Im-



• SECTION through tank showing precast settling tank walls.



• SECTION through vitrified tile wall for the filter, with footing and reinforcement.

hoff tank, which has a settling chamber capacity of 6,225 gallons, a new and larger Imhoff tank was constructed alongside, so that the two could be operated in parallel. This new tank is a two-compartment Imhoff, 22.0 ft. wide and 30.3 ft. long, with a settling chamber capacity of 15,600 gals. Together, the tanks provided retention of 3 hours 20 mins. for average flows and about 2 hours 20 mins. for peak flows. Assuming a desirable sludge digestion capacity of 3 cu. ft. per person, the new tank provided 8,014 cu. ft. and the old tank 1,220 cu. ft., a total of 9,234 cu. ft., or 3.07 cu. ft. per capita.

Surface loading on the settling tanks is 270.7 gals. per sq. ft. per day. Weir loadings are 5,263 gals. per ft. length of weir per day. Slot widths and overlap are each 8 ins. Sludge withdrawal pipe is 8-in.

Hydrostatic head on the sludge pipe is 6.5 ft. Wooden end baffles are provided, with adjustable steel overflow weirs. Gas vent area is 24.5%.

As previously stated, the walls of the settling chambers were precast, hoisted into position and grouted. A 3-inch wide ledge was constructed in the end walls of the tank to support these. This procedure eliminated the necessity for expensive formwork necessary for casting these walls in place.

The Filter

The BOD loading on the filter, based on design flow with 35% removal in the settling tanks, is 331.5 pounds. The filter loading is 1.25 lbs. of BOD per cu. yd., requiring a filter volume of 265.2 cu. yds. With a 40-ft. inside diameter, media depth is 5.7 ft. Media is slag, graded from $2\frac{1}{2}$ to 4 ins., and meeting the usual sodium sulfate soundness test. This slag was available from a nearby steel mill and cost considerably less than crushed stone or gravel. Also, because of its lesser weight, it was cheaper to place. Armored underdrains were used in the filter.

A feature of design which saved money was the use of 6" x 12" x 12" glazed vitrified tile blocks for the filter walls. This wall is 8 ft. high and the blocks are reinforced. Each block has a slot in the top in which

the reinforcing rods were placed, the remaining space then being filled with grout. The bottom course of blocks was sunk about 6 ins. into the footing, which is 18 ins. deep and 20 ins. wide. Reinforcement in the bottom course consist of two $\frac{3}{4}$ -inch rods; each succeeding course required less steel; and in the top course a single $\frac{1}{2}$ -inch rod was sufficient. The top course of blocks was rounded off with a grout capping.

Oxidation Ponds

With an estimated reduction through the filter of 55% of the applied BOD, the effluent at design load would contain 149.2 lbs. of BOD. On the established basis of 50 pounds of BOD per acre for reduction ponds, an area of 3 acres was provided. A pump with a capacity of 100 gpm is provided to recirculate lagoon effluent to the inlet of the Imhoff tanks. This is a safety measure. Due to the nearness of the plant to a residential area, it was necessary to give special consideration to odor prevention. In times of low flow, recirculation may be necessary, but it will not be used routinely.

The sludge drying beds provide an area of 1,512 sq. ft., or about 0.5 sq. ft. per person. This has been found to be ample for this section of Texas.



• HIGH-RATE filter, with vitrified tile walls, was designed for organic loading of 1.25 lbs. per cu. yd. Media is slag.

Think of WELLS for that Field Water Supply

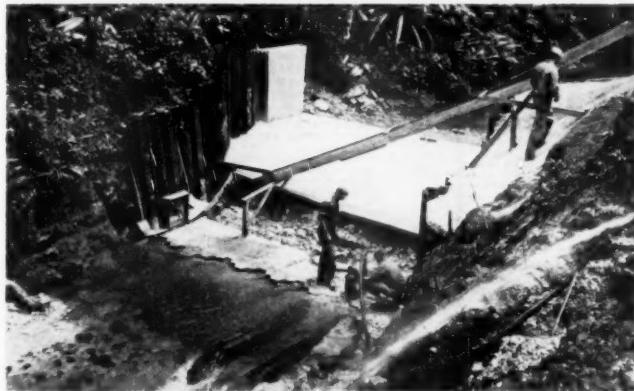
CDR WALTER G. WATERMAN
CEC, USNR

A REALLY curious mental block exists among many engineers on the use of wells as a source of water supply. Wells are widespread throughout the United States: over 20,000,000,000 gallons of water is pumped daily from them and over three-quarters of the population derives its water supply from wells. Yet the average engineer when confronted with the problem of providing a water supply thinks only in terms of a surface supply. Let me illustrate.

At the 1950 Bureau of Yards and Docks symposium in Washington, D. C., the 125-plus engineers present were divided into sections. Each section was assigned the problem of planning the construction of an advanced base. The problem involved, among other items, the construction of a water-supply system. The terrain included a valley through which a small stream meandered. With one exception this stream was eagerly seized upon by all sections to furnish the water supply. Use a bulldozer to throw an earth dam across the lower end of the valley, thereby solving the problem. Let's go on quick to something important, such as where will we locate the tank farm?

The reasoning behind this solution was an eye-opener on the average engineer's lack of general knowledge on the subject of water supply. It is clearly demonstrable that this subject is of primary importance; the tank farm and other items simply cannot exist without a dependable water supply. This article is therefore being written to spread a little general light. It will not delve into technicalities, formulas, or similar diversions that obviously would have slight application to such a problem.

In the first place let us consider what the objections are to a surface supply for this advanced base. The dam itself, of course, is subject to an



• **IT MAY be fun to build a dam, but wells are often better.**

attack. However, this is not too serious, as a dam is supposedly hard to hit and even if ruptured could probably be repaired quickly. It is also subject to special maintenance problems, such as wash-outs from floods, which although somewhat of a nuisance, are not too serious.

However, a real and important objection does exist in that it is practically impossible to protect the watershed contributing to the created reservoir from contamination by the forces of the advanced base camp or by the natives.

It is difficult to protect a watershed in a civilized community. In spite of stringent regulations, fences and policing, most communities using a surface supply must have filtration plants controlled by laboratories to insure a safe supply. Measures such as these are out of the question at an advanced base. About the best that can be done is to load the water with chlorine and hope for the best—a truly pious hope, as chlorine treatment alone does not

always produce a safe water supply, especially if the turbidity is as high as it is apt to be in this case. The turbidity, in effect, runs interference for the bacteria, who, when the blocking is well done, can crash through for big yardage and literally knock the base personnel flat.

Even if the chlorine did produce safe water it would not be desirable water. Water with a high chlorine content tastes down-right repulsive. Therefore, the boys fill their canteens with that nice stream water (before chlorination) or they do not drink enough water to stay healthy. It is also an interesting fact that although there are relatively few diseases, such as typhoid, that are transmitted by water, a poor water supply increases the mortality rates of all diseases. There are records of communities before and after an improvement in the water supply quality that demonstrate this.

The development of ground water instead of a surface water supply might provide a satisfactory answer to the problems enumerated above. Most Navy advanced bases are constructed adjacent to the ocean or other large bodies of water. Ground water travels towards these large bodies of water, gradually ap-

(Continued on page 138)

*An article reprinted with thanks from
the CEC Bulletin of the Navy
Department*

<p>CMP-4C Instruction Sheet Revised April 17, 1952</p> <p>U. S. DEPARTMENT OF COMMERCE NATIONAL PRODUCTION AUTHORITY</p> <p>Instructions for Filing Form CMP-4C—Construction Projects</p> <p>PERSONS WHO SHOULD NOT FILE FORM CMP-4C</p> <p>1. Small quantity requirements (Who may self-authorize)</p> <p>A person making small quantity requirements in controlled material items which are not filed in Schedule 1.</p> <p>2. Petroleum Applicants for refining and distilling units will file NPA Order M-1.</p> <p>3. Electric utility Electric utility applicants for facilities will not file in the Division, as per Aeronautics Adm. S. Memo (see 1).</p> <p>ADDITIONAL INFORMATION</p> <p>1. Water-well drillers requiring allocations for the construction pursuant to Direction Regulation No. 6 for Form CMP-4C quantities of materials must be filed with the initial quarterly application but</p>	<p>Form approved—Budget Bureau No. 93-R162.1</p> <p>GENERAL</p> <p>Where to file Address applications to the appropriate agency as shown in Schedule 1 of these instructions.</p> <p>When to file (a) The initial application for an allotment of controlled ma-</p>	<p>Form Approved - Budget Bureau No. 93-R162.1</p> <p>FOR GOVERNMENT USE ONLY</p>
<p>CONSTRUCTION PROJECTS (Check appropriate boxes.)</p> <p><input type="checkbox"/> Application for authority to commence construction</p> <p><input type="checkbox"/> Application for authority to continue construction</p> <p><input type="checkbox"/> Application for allotment of controlled materials and equipment</p> <p><input type="checkbox"/> INITIAL <input type="checkbox"/> REV.</p> <p>Item 1 - Name and mailing address Be directed for further information.</p> <p>II Filed by other than certifying that person Name _____ Title _____</p> <p>File this application NO FURTHER APPLICATION REQUERIES ARE CLE</p>		
<p>THE MATERIALS SITUATION FOR WATER & SEWAGE SYSTEMS</p> <p>GERALD E. ARNOLD, Director, Water Resources Division, NPA</p>		

ABOUT a year ago the Water Resources Division was established as a claimant agency within the NPA to handle the material allotments for the water and sewage works of the country. This was the last Division organized within NPA, and came into existence about a year after the organization of the agency. Harvey Howe, Vice President of the Lock Joint Pipe Company, was appointed director of the division, and he was succeeded by the writer in September 1951.

The area of responsibility of the division includes ground and surface water supply; transmission; pumping; treatment; storage; and distribution for domestic and industrial use, including storm water control and drainage of flooded areas; the collection, treatment, and disposal of domestic and industrial liquid wastes; and sewage collection, transmission, pumping, treatment, and disposal. Within this area fall most of the water and sewer systems of the country. The division processes about 2,000 cases each quarter, has allocated in excess of 200,000 tons of steel, and handled a construction dollar vol-

ume in excess of \$500,000,000 each three-month period. It is staffed partly with men recruited from the industry and partly with regular government employees.

At the outset there was a backlog of work to be handled, and the volume of incoming applications was so great that some delay was encountered in processing applications, but this backlog has now been disposed of and the operations of the Division are practically current.

What the Division Does

The Division serves two principal purposes: as a claimant agency it obtains allocations for its portion of available materials from the NPA, and then it allocates these materials

to water and sewage systems for construction purposes. When the Division makes claims for materials, it is necessary that the quantities of materials needed in the field be known. These figures are compiled from the applications received in the Division and from other sources. Compilation and presentation of these figures is done by the Program and Requirements Branch. The processing of applications received by the Division and the allocation of those materials needed is done by the Technical Engineering Branch. The Division keeps its own books and receives materials and reallocates them, keeping a daily balance of unexpended allotments.

Each application, as it is received,

is carefully screened to determine the essentiality of the proposed work. If the work falls within the criteria for which allotments can be made, the case is then analyzed for accuracy of the requested materials. When processed, the authorization is prepared and sent through the Routing and Issuance Office of NPA to the applicant. The Water Resources Division is operated on the basis that if a facility is needed, it must receive all of the materials required for its construction, and therefore allotments are granted at 100% of the requirements. Obviously, 90% of a pipe line or 75% of a pump station would be useless; but in some instances, applicants pad their requests thinking they may get a percentage cut in their allotment. For this reason, the quantities in each application must be carefully checked. Under the Controlled Materials Plan, the material available for allocation is based on the production capacity of the country. At present the only controlled materials are steel, copper, and aluminum. Each claimant agency makes its request for a portion of the available supply in each quarter, and these requests are then totaled and compared with the available supply which can be allocated by the Control Board to claimant agencies. It is necessary that claimant agencies have substantiating facts as to their requirements in order to obtain the quantity of materials necessary for their operations. Manufacturers have historical records of the quantities of materials they need, but the construction industry is dependent on individual construction projects. In the water and sewerage fields, the construction of facilities varies with

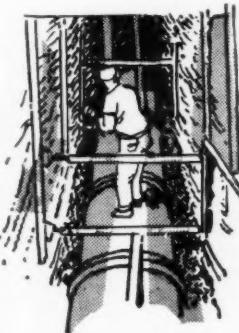
of which are doing some construction work. Determination of the total quantity of materials required for the industry is not an easy task.

Getting Materials

Construction projects involving less than five tons of steel or 1,000 pounds of copper and 2,000 pounds of aluminum, or requiring less than \$15,000 worth of rated orders for building materials, may be self-authorized by the owner. Any construction project requiring in excess of these quantities must receive an allotment of material and an authorization for construction from NPA. This is obtained by filing with NPA an application on Form CMP-4C. Consideration is now being given to increasing the self-certification limits for water and sewerage works. Any material received for water or sewerage construction and not needed during that quarter is subject to the general inventory limitations of the CMP orders. Materials allotted for a quarter but not received or not needed during that quarter should be returned to NPA, and a request made for revalidation of the allotment to a later quarter. This can be done readily, and material users should not be fearful that they will lose the allotment by returning it for revalidation at a later date.

In filing the application for construction, complete substantiation of the need is necessary. One page of the application form is left blank for supplying this necessary data. If additional sheets are needed, they may be attached. Supporting letters from county or state health officers or other interested parties will be beneficial in justifying the need for a construction project.

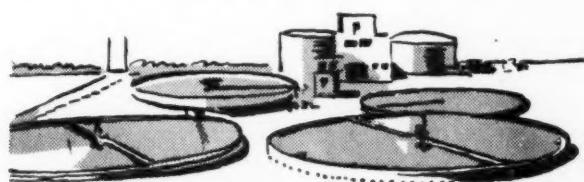
capacity in this country is in excess of 100,000,000 tons. The loss of production during the strike period is estimated at about 20,000,000 tons. Production of steel for defense needs is the first requirement of



the re-opened mills, and this means that civilian operations will be delayed. We are now required to process for issuance only those cases in the water and sewerage fields which are for replacement of existing facilities destroyed or damaged by catastrophe, which are critically necessary in order to prevent community epidemics from a public health standpoint, or which are vital to the military or atomic energy programs. This means that only the cases which fall in these three criteria can be given approval for allocation of steel in the third quarter. Some additional steel will be available for projects already under construction and for facilities essential to defense production in the fourth quarter. Indications in this time are that similar restrictions will be imposed for the first quarter 1953. For this reason, it is recommended that all applicants for materials for water and sewerage projects give careful consideration to the absolute necessity of their proposed construction work before making application for the necessary materials.

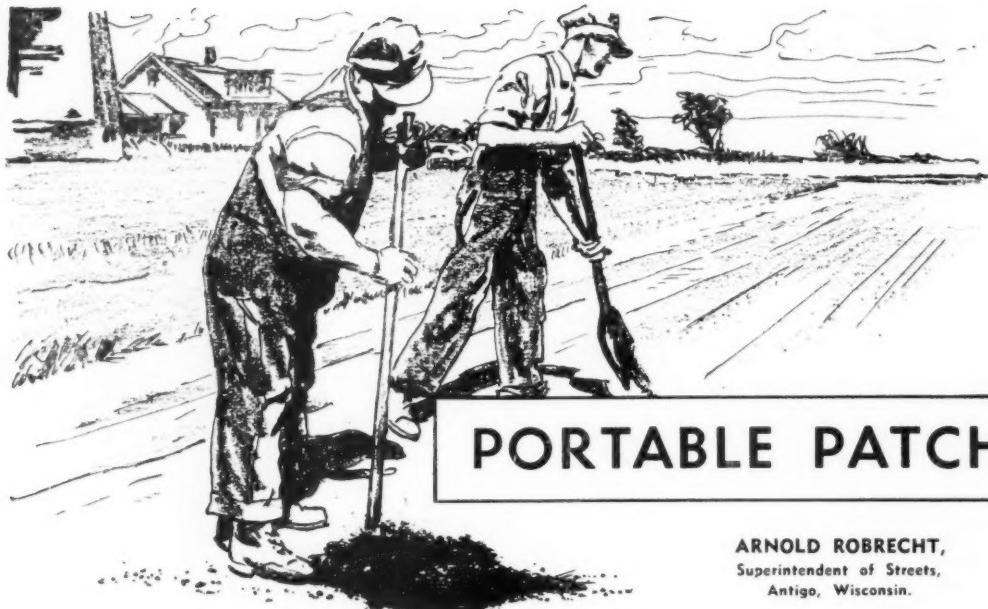
Some items of steel are less readily available than others, plate and structural shapes being particularly tight. The substitution of reinforced concrete construction to save plate and structural steel is recommended. Substitution of other materials to save steel is recommended wherever possible. In some instances, authorization for construction and the allocation of copper and aluminum to construction projects can be made where no steel is required.

(Continued on page 136)



the needs of the communities, with changing weather conditions, and with industrial expansion. The water and sewerage industry is largely a construction agency with regard to materials requirements, and materials obtained must be based on the anticipated construction work for each quarter. There are an estimated 30,000 water and sewer systems in this country, all

Until June 2, 1952, the steel situation was materially improving, and indications were that controls could be appreciably relaxed before the end of 1952. The steel strike, however, resulted in a serious loss in the production of steel in the country and has delayed further relaxation of orders and regulations governing steel for many months. The annual steel production



PORTABLE PATCH

ARNOLD ROBRECHT,
Superintendent of Streets,
Antigo, Wisconsin.

THE "answer to my prayers" is painted green and weighs a little better than 3 tons. Most of the time it sits on its two rubber tired wheels in front of our Street Department Garage. Consistently, it turns out the answer to our street patching problems; problems which have plagued me and all other Street Departments Officials for years.

Antigo, a town of some 10,000 population is located in the heart of Northern Wisconsin's resort area. Despite its rustic surroundings, it has a considerable industrial population and also is an important market center and rail head for many farm products grown in the area.

Four major highways pass through the city: U. S. 45 and Wis-

consin Highways 64, 47 and 52. All of these roads bear heavy passenger and truck traffic. While the State of Wisconsin provides the funds for the repair and maintenance of these highways, as they pass through our community, the City of Antigo is nevertheless responsible for the physical maintenance of the roads. In addition, we have more than 48 miles of streets within the city. Most of these streets are either black topped, having been machine laid, or, in the majority of cases, oil mat surfaces which have been bladed into place.

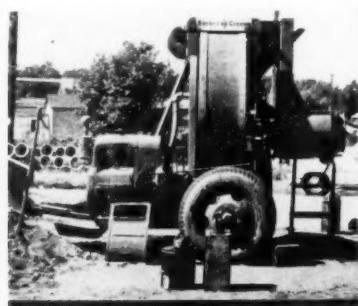
I have been associated with the Street Department of the City of Antigo for 14 years and have been superintendent of this Department since 1950. Like my opposite num-

bers in cities all over the country, I have seen our streets deteriorate over a period of years due to increased cost of maintenance, greatly increased traffic use and a general shortage of manpower. Coupled with this has been the lack of a suitable method of producing the material for doing patch work.

I feel that this need for a small and economical piece of equipment for producing patch material has been more keenly felt by communities of our size rather than the larger metropolitan areas. In the latter case, there are usually a number of contractors who operate either permanent or portable asphalt plants in the vicinity. Patch material is generally available from these sources although, I under-



• PATCH material is loaded from stockpile into truck.



• MIXER is located near stock-

stand, frequently the right type of material is not available, making it necessary to use a makeshift, as we have done in the past.

The Old and the New

Until the latter part of June of this year, we have produced our patch material by blading aggregate back and forth until it dried by the action of sun and wind. We would then mix this material with an appropriate amount of road oil and carry it to the patching site in one of our trucks.

Although we realized that we were not achieving the most suit-

distributor who invited us to a demonstration of a completely new type of maintenance asphalt mixer. This machine was called the "Mixall" and was manufactured by the Barber-Greene Company, Aurora, Ill.

Enter the Mixall

We saw a demonstration of this machine in Green Bay, Wisconsin, and decided almost immediately that it was the machine for us. It appeared to me that we could operate this unit either in our yard, producing cold mix for stockpiling against future need, or that we could use it right out on the job if

of the machine. The operator then merely scoops the aggregate into the skip with a shovel, and is put to comparatively little physical effort in so doing. The skip raises and drops the aggregate material into the dryer drum.

This rotating drum has a number of curved flights bolted around its inside diameter. These flights pick up the aggregate material and drop it repeatedly through a blast of hot gas and flame which is provided by an oil burner.

After the aggregate has been dried, a chute drops it into the mixing pugmill and an appropriate amount of asphalt is added. The asphalt container is, in reality, a measuring graduate, and by maintaining uniformity in the amount

PLANT SOLVES OUR STREET PATCHING PROBLEMS

able type of material for our needs, our principal objection to this system was the comparatively few months out of the year when it could be operative. Our winters frequently hit 30° below zero with snow all over the place. Obviously this system was completely unfeasible at such times. Even in the Spring and Summer, rain would frequently set our operations back to the zero mark, wasting a great deal of time and money for us.

In an effort to find a more suitable and more efficient means of producing our patch material, I approached the Mayor of Antigo, Derwood McIntyre, and the City's Councillors, Gerald M. Mikkelsen and Al Hovey. All of us called on Homer Caldwell, a local machinery

desirable to do so. It also appeared a minimum number of operating personnel would be required.

I'd like to describe the operation of this machine very briefly: Generally speaking, I would say that it resembles an oversize concrete mixer. The aggregate material is fed into it by shoveling into a power-operated skip. We use a front-end loader to shove our aggregate material up close to the front

of aggregate and bitumen used in each batch, we keep the quality of the mix the same at all times.

When the materials have been thoroughly combined in the mixing pugmill, they are dropped into a wheelbarrow. We normally keep our stockpile of mixed materials close to the machine's location so that it requires only a few seconds to dump the wheelbarrow and return it to

(Continued on page 126)



pile so one man can operate plant.



• MEASURING container insures accurate bitumen content.

INDUSTRIAL WASTES —A COMMUNITY PROBLEM

The Responsibility of the Community with Regard to Industry

EDMUND B. BESELIEVRE,

Mem. Amer. Soc. Civ. Engrs.

Chief Sanitary Engineer,
International Sales,
The Dorr Company.

THE treatment of industrial wastes has been a problem for many years but increasingly so in the last decade. However, little has been written of the place or the importance of the community in the problem. Practically all of the published material has been confined to the physical aspects of treatment of the wastes to prevent or abate pollution, or on the responsibility of the creator of the wastes—the industrial plant—to the public.

Inasmuch as the impact of industrial waste does involve the community in a variety of ways, it is believed timely to discuss these factors.

In an industrial center anything that affects or is apt to affect the status or continued prosperity of the industries is of prime importance to the community as a whole. Therefore, it is incumbent on local officials and organizations to recognize that they have a very definite responsibility in this problem.

It has been common practice—too common—in many communities to consider industry merely as a source of additional revenue in the form of taxes, license fees and contributions to public schemes and institutions. Too little thought has been given to the debt that is owed to industry by a given locality; and it has not been generally realized that every industry in a community has the same right as any individual

citizen or taxpayer to have its interests looked after and protected. It has a right to police and fire protection, streets, lighting, mail service and all other public services. Likewise, its problems are those of the community as a whole and deserve to be looked upon sympathetically.

Industries are originated, it is true, for the purpose of producing a profit for their owners and stockholders and, as long as that is done, the industry will operate and produce. On the other hand, if the industry is penalized by community acts to the extent that reasonable profits are not forthcoming, then the industry will fail and discontinue entirely or move to another locality where the public attitude is more sympathetic.

In a community which has become the residing place of a considerable group of labor, anything that interferes with their earning livelihood in that area will, in the end, materially affect the well-being of the entire community. If, due to unwise demands or lack of cooperation

on the part of the people or the officials towards the industry, it is forced to shut down or move, the labor which has relied upon that plant for its bread and butter may be thrown upon the community, forcing it to come to their relief with funds and other supplies.

A large segment of the population on relief, whether it be permanent or temporary, puts a severe drain on the resources of the average community and tends also to create a feeling of dissatisfaction on the part of those receiving charity. Every person is a self-respecting entity and no right-minded person wishes to be the recipient of charity. But, if the means of employment fail, then it becomes the duty of the community to prevent distress. If this condition is clearly due to acts of the public officials then it is equally clearly the responsibility of the community to take care of those it has injured until such time as other means of support can be found. The cost to a community for continued outlays for relief can easily amount to much more over a period of time than the cost of measures which it might have taken to assist the industry to continue in operation.

Cooperation with Industry in Its Wastes Problems and the Benefits to the Community Therein

Industrial wastes are the products of industry. As such they are clearly a problem for the industry. If those wastes are discharged into a stream which is used as a potable water source, industrial water supply, and/or for recreation, and the wastes prevent such use or uses, or cause inordinate expense on the part of other communities or industries to remedy, then industry has

a clear responsibility to abate that condition.

However, if the treatment of the wastes in question is likely to be a costly process—one which would entail such heavy expense on the industry as to cause it to consider relocation in a more favorable area —then it becomes the duty of the local community, if it wishes that industry to remain in its midst, to

cooperate with it and to assist it in finding a solution to its problem which will assure its continuance as a tangible community asset.

How, then, can a community cooperate with industry in its wastes problems? In many ways. First, when it is found that an industry which is a large employer of local labor and a heavy tax-payer is creating a waste problem, the community can come off the side-lines. It can initiate a meeting with the officials of the company to discuss the problem and endeavor to ascertain wherein the community may be of service. Such a sharing of interests will convince the industry that the community does have a heart and is really interested in its problems.

Secondly, after the problem has been jointly discussed by the group then the community officials can initiate a conference with the State Health Department or other regulatory agency which is enforcing the treatment of the wastes, to determine the extent to which the industry actually need go. As the industry is considered the culprit in having produced the waste which is polluting the stream, it is on the defensive with the compelling authorities. Anything that the industry does which tends to produce the impression upon the State or other agency that the industry is stalling for time is a black mark against it. On the other hand, if a joint group, representing both the local community and the industry, waits upon the enforcing officials and shows them that by joint action they are willing to cooperate with the State, the result will be an amicable session out of which may readily come a solution acceptable to all parties.

Thirdly, after having reached a satisfactory basis, the community may further help by permitting its engineering staff to assist the industry in ascertaining the volume and constituents of its wastes, the possibility of handling these wastes in its public sewerage system, and of treating them at its treatment works, with or without additional units or phases of treatment. Such cooperation can easily save the industry a considerable sum.

If the wastes are complex in character, the industry will be best served by engaging specialists in the treatment of wastes, to study their problem and produce, within the end result agreed upon, an economical and practical plant. This the local engineering staff will not

normally be equipped to do, but the preliminary work of measurement of flow volumes, periodicity of flow, individual flows from various plant sections, the possibility of taking the wastes into the local system, etc., can readily be done as a public service by the community staff. This reduces the amount of the fee to be paid to the consultants and will be welcomed by them. If they were required to obtain these data they would have to hire local staff and provide expensive supervisory assistance from their headquarters. They would prefer to be relieved of this load.

Fourthly, the local press can discuss the waste problem in its columns, pointing out the importance of the industry to the community and calling upon the citizenry to look sympathetically upon the prob-



lem and not to expect the pollution to cease the moment the authority calls upon the industry to abate it. It takes time to study a problem thoroughly, to evaluate all the factors, and to arrive at a satisfactory conclusion. It requires more time to prepare plans, have them approved by the enforcing agency, and construct the works required. It may well be a year or more after the initial demand has been made before the treatment works required can be put into operation. The local

press can urge patience upon its readers, showing that the industry is doing its best to remedy the trouble and, in due course the pollution will be abated.

The local press can also perform a useful function by discussing some of the practical phases of the problem. If an industry has been discharging a waste containing a high proportion of organic matter which settles in the stream and gradually decomposes, causing odors, gas ebullition, or unsightly surface scums, it must not be expected that the very moment the treatment plant is put into operation all of these nuisances will immediately cease. The organic deposits already in the stream require a period of time in which to become stabilized and inoffensive and the unsightly condition will continue until stabilization has been reached, regardless of the better effluent now being discharged. This time lag may last for several weeks or months, depending upon the amount and character of the deposit. Public patience during this transition period is necessary.

A further important community contribution will be to permit the engineers and chemists of the industry to use the laboratories and testing facilities of the community, if the industry has none of its own. The industry is, in effect, paying for these facilities through its taxes and other contributions and is, therefore, rightfully entitled to a normal use of them. This form of cooperation may materially affect the good will between the industry and the community and help to dispel the thought that the industry is not trying to do its part or is stalling the issue.

In a city or community having a



Courtesy Dorr Co.

● PALO ALTO, Calif., plant treats sewage and cannery waste.

number of industries, all of which may be contributing pollution to a stream, it is very probable that sooner or later a clean-up program will be forced upon it. It is, therefore, advisable to be prepared for this moment, by making a city-conducted survey of the wastes of the local industries so that when the notice comes the community can present complete data on the wastes. This will expedite the solution of the problem. With such survey data, the total volumes and the characteristics of the wastes from the individual plants will be apparent. Studies then can readily be made of the value and economy of combining wastes to produce the mutual reactions which frequently make it possible to show important savings, while at the same time producing satisfactory effluents. This should be done in a systematic manner, not under the pressure of enforcement. More good is likely to come from considered, unhurried study and thinking than, if at the last moment, a hasty and scanty survey is made and snap judgments are based on it.

This survey should be undertaken by the engineering or public works staff of the community, co-operating with the local health authorities and with the assistance of the engineers and operators of the industries involved. Complete co-operation between these three groups is essential. The industrial plants must be willing to provide

complete information on the volume and characteristics of their wastes, and the public officials must be equally willing to conduct their survey in an open and impartial manner.

It would be a wise move, in any industrial community, to form a committee, consisting of members of the city engineering staff, public relations and health officials and representatives from the industries, to outline the form of the survey and the part of each member in it. This committee can formulate the actual survey methods, the scope of the survey, the time elements involved, and can distribute the cost properly among its members.

What the Survey Should Cover

The survey should embrace the general subjects shown in Table I.

Following the receipt of these data from industries in the jurisdiction of the given community a master sheet should be prepared, summarizing the individual data, assembling it into classes of wastes, with special reference to total volume of acid and alkaline wastes, non-polluting wastes, inhibitory wastes, etc. A map should also be prepared, spotting each industry, together with the logical site for joint plants, individual plants, etc. This will materially assist in determining the economic possibility of combining wastes for the benefit of the mutual reactions as compared

to individual plants at each factory.

These data and the map will be of invaluable assistance to the State or other enforcing agency when the time comes for action on pollution abatement. The community that goes before the meeting with this information in hand will find an enthusiastic welcome and will have a starting point for a rapid, satisfactory and economical solution to the problem. The old adage—"in time of peace prepare for war" applies with equal force to this readiness for action against pollution.

Editor's Note: This is the first of a series of articles by Mr. Besseville on industrial wastes and their treatments.

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Charges for Water Service to Subdivisions

About a year ago, Boulder, Colo., adopted a policy requiring property owners to pay for installing water mains. This policy has now been changed, especially in respect to subdivisions. Hereafter, developers of subdivisions or owners of property in new areas to be served will pay in advance for the cost of installing the mains. Then the city will pay back all revenue received for six years from users connecting with the main, except that revenue in excess of the cost of the main will revert to the city.

TABLE I—OUTLINE FOR INDUSTRIAL WASTE SURVEY

1. Name of industry (The individual plant name)
2. Location of plant (This is important for locating the plant on a community map for later consideration of combinations of wastes.)
3. Class of product
4. Raw materials used in product
5. Process materials used in production
6. Volume of wastes
 - a. Total volume per day
 - b. Maximum hourly flow
 - c. If more than one waste discharge, the flow and flow period from each
 - d. Volume of flow of cooling waters and other non-polluting wastes
7. Characteristics of wastes
 - a. Acid or alkaline
 - b. Contained chemical elements (name them)
 - c. Concentration of each above element
 - d. Organic content
 - (1) Character of organic matter
 - e. Biochemical oxygen demand (BOD) of wastes (total and individual)
 - f. Characteristics of each individual waste, if more than one
8. Logical point of discharge into stream
9. Condition of stream at point of discharge of these wastes
 - a. BOD
 - b. Volume of flow as compared to waste flow from plant named in line No. 1
10. Use of stream below discharge point of these wastes
 - a. Potable water for downstream community
 - b. Industrial water for downstream industries
 - (1) Types of such plants (Products made)
 - c. Recreation
 - (1) Swimming
 - (2) Boating
 - (3) Picnicking on banks
 - d. Watering of live stock
11. Present means of disposal or treatment of wastes
 - a. Direct to stream
 - b. Treatment plant (Description)
 - (1) Partial
 - (2) Complete
 - c. Coagulants or precipitants used
 - (1) Amount of each per day
12. Possible elements of value in wastes for recovery study
13. Elements in waste of possible inhibitory effect on sewage treatment processes or structures
14. Area available for plant structures, if at-source treatment is indicated.
15. Special remarks and data

HOW Raleigh Sold The Need for MORE WATER

J. L. MORRISON,
UNC School of Journalism,
Chapel Hill, N. C.

A SERIOUS water shortage was experienced in the fall of 1951 by the City of Raleigh, N. C. The City Council immediately clamped down on all non-essential outside uses of water, including car washing and the watering of lawns. Hotels

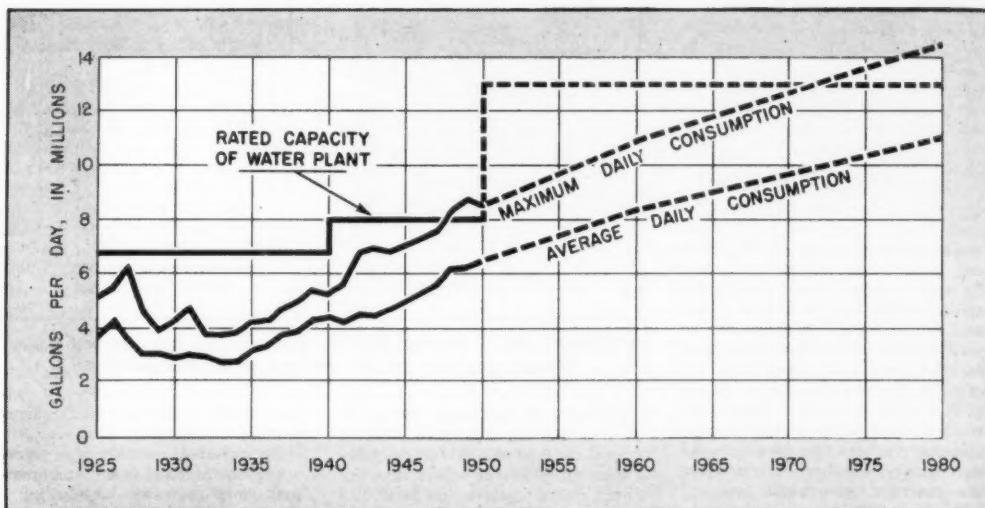
and restaurants posted notices that they would serve water only on request. To crack down on the "deadbeats" who operate in every city, the Council decreed that any consumer who used more than two-thirds the water he did a year ago would be billed for the excess at 500 per cent more than the regular water rates.

The only extraordinary part of the whole performance was the calmness with which Raleighites greeted the emergency. Citizens of nearby cities with plentiful water supplies found they couldn't get a rise out of Raleighites, who refused to get ruffled when kidded about their plight. Raleigh people did not, as might have been expected, call for the head of the City Manager, nor did they call down imprecations on the heads of City Council members or of the Mayor. They refrained from these things, in fact, because earlier in the same year they had been begged, urged and prodded to approve a bond issue for the expansion of water storage and filtration facilities. The fact that they had approved the bond issue by a 3-to-1 majority at the urgent insistence of their municipal officials remained fresh in everyone's memory. True, there was a serious water shortage but something was being done to prevent a recurrence. For once a City Manager was in the happy situation of being able to say—without endangering either his life or his job—"I told you so."

When City Manager W. H. Carper took over his present job in September, 1950, he inherited a long-deferred municipal improvement program of which the water supply was only one of five major items. By the end of October he had presented the City Council with a complete analysis of Raleigh's sources of raw water supply. The most critical chart developed as a result of actual tests run off only a week before, tabulated results using all possible combinations of pump facilities and gravity flow from the city's two sources, Lake Johnson and Swift Creek. This chart made it clear to all that in the event of a definite shortage at the source or breakdown on either of these lines, neither of the pump facilities at the individual sources could provide any margin of safety over the existing peak demand.

Out of this study came the proposal to include, in the bond issue program, funds for a new line paralleling that to Swift Creek, a matter of 38,850 ft. of 24-in. Lock Joint pipe, and additional pumps. Also, it was clearly desirable to build a dam at Swift Creek, raising the level of the pond by 10 ft. and providing an added storage capacity of a billion gallons.

By January, 1951, Mr. Carper had reduced to paper a comprehensive program of enlargement and addition to the city water system at a then estimated cost of \$3,118,000. For clarifying matters to City Coun-



• THIS was Mr. Carper's No. 1 chart. It showed how the rated plant capacity was often exceeded.

cilmen, Mr. Carper divided the project into three parts, as follows:

Part A, including the already mentioned program at Swift Creek, would also call for raising Lake Johnson five feet. The over-all storage expansion will provide about 1.2 billion gallons in new storage which means 160 days of additional storage at the present rate of water use.

Part B. The water filtering and purifying capacity is proposed to be increased from the present 8 mgd to 13 mgd with 4 million gallons finished water storage.

Part C. Constructing a 1 million gallon elevated water tank in the northwest section of the city, with necessary high-capacity feeder mains.

Selling the Program

Mr. Carper, having gotten the City Council to set a date of Feb. 3, 1951, for the bond election, set carefully to work educating public opinion on the need for the new bonds. His first step was to have mimeographed a large quantity of reports "Municipal Improvement Bond Program, Raleigh, N. C." These were distributed to key citizens active in civic clubs and associations of voters. At the end of each report, to which Mr. Carper affixed his signature, was this paragraph: "Your City Government will do all it can to give you the facts about this program. If any point is not made clear to you, please call or write the City Manager or any member of your City Council."

This invitation was repeated insistently in the press and on the radio through co-operation with the newsmen of Raleigh, and as a result Mr. Carper and other members of the administration made dozens of talks before citizens' groups on the merits of the entire program.

Raleigh's water system was only one of the units being considered along with sewage disposal, storm water drainage, street paving, and a recreational program. In each special area Mr. Carper spent long hours drawing up charts and other illustrative materials by way of dramatizing Raleigh's need for the bond issue. With the help of E. M. Johnson, Raleigh's Director of Public Utilities, for instance, he worked up a series of charts suitable for platform use which proved exceedingly effective in justifying the water system expenditures.

Four separate charts and graphs worked up by Mr. Johnson and pre-

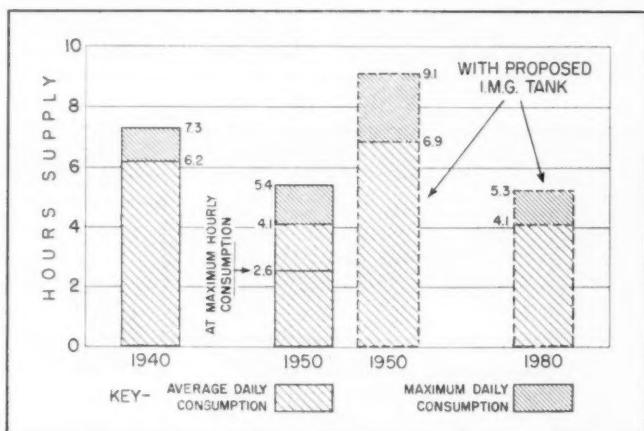
sented by Mr. Carper did their work with maximum effect. Possibly the most effective was the chart "Daily Water Consumption and Water Plant Capacity" in which it was made clear that, as of 1950, the maximum daily consumption often exceeded the rated capacity of the water plant. By projecting the figures into the future it was also possible to point out that within 10 years even the average daily consumption would top the 8 mgd rated capacity of the city's water plant. Moreover, the chart also showed that—on a projected basis—the 13 mgd planned capacity would satisfy the maximum daily consumption until 1973.

Chart No. 2, which Mr. Carper took with him on every platform appearance, showed "Finished Water Storage Capacity at Plant." This chart made clear how the city in 1928 had, at maximum daily consumption, 22.8 hours of supply. This, by 1950, had dropped to 11.2 hours. Further, at maximum hourly consumption, the figure was down alarmingly to 7.2 hours supply. Mr. Carper demonstrated that, with the addition of the proposed 4 mg clear well storage at the plant, the 1950 hourly supply would be brought back to approximately the old 1928 figure, or 22.4 hours supply at maxi-

Elevated Storage Needed

Need for more elevated water storage was made graphic by Chart No. 3, "Finished Water Storage Capacity in Elevated Tanks." Between 1940 and 1950, the chart showed, Raleigh's elevated storage had dropped from 6.2 to 4.1 hours supply at maximum daily consumption. It was shown that, with the addition of the proposed 1 mg tank the reserve would be built up to 6.9 hours supply immediately and would revert to its present 4.1 figure only in the remote year of 1980.

The final chart brought home to all the facts of Raleigh's population growth, both within the city limits and in Raleigh Township. Mr. Carper pointed out: "The number of people living here has increased about 35 per cent since 1940 to a city population of 65,000 and a Township population of 78,000. Water use has increased from an average of 4.4 million gallons per day to 6.4 million gallons per day since 1940. For the last three summers the demand for water has exceeded the rated capacity of the water plant. The available raw water supply is dangerously inadequate for the present Raleigh." How right Mr. Carper was in his role of Cassandra was eminently borne out by



• CHART No. 2 showed how dangerously low the finished water storage capacity at the Raleigh plant has become.

mum daily consumption. The chart showed that the additional finished water storage would remain adequate until 1980, at which time the figure would again be down to 13.3 hours supply at maximum daily consumption.

the water famine later in the same year.

By a 3-to-1 majority the voters approved the bond issue for municipal improvements, largely as a result of the enlightened education—
(Continued on page 133)



• EXTENSIVE use of loaders permits more work at less cost.

HOW TRUCK LOADERS SOLVE OUR LOADING AND CLEANING PROBLEM

L. D. MERRILL,

Superintendent of Streets,
Birmingham, Alabama

LIKE most cities, Birmingham faces a variety of loading and cleaning problems in the maintenance of its streets, parks and other public properties. We have found that the one best solution to all these problems is a motor truck equipped with a Holmes-Owen loader.

In fact, we were so well pleased with results from our first loader—purchased in May, 1950, and mounted on a Ford F-6 chassis—that we acquired a second Holmes-Owen unit, which we have mounted on a Chevrolet 6400 chassis; and now we plan to purchase two more of these units this fall.

We use these trucks primarily for removal of street sweepings left behind by motor sweepers. This was formerly a time-consuming and costly operation, requiring considerable hand labor. Now, through the use of the Holmee self-loading units, we have greatly reduced labor costs and, in addition, have so speeded operations that the trucks can keep right up with the sweepers. Formerly, with the use of hand labor, this was impossible.

Another use to which we put



• ONE-MAN operation: Truck-driver loads, hauls and dumps.

these loaders, representing a substantial saving in labor and in money, is the collection of leaves from our streets in the fall. We believe we have solved this problem in a most effective manner. First, we wet the leaves by flushing the street with our power flushers, thus preventing the leaves from blowing, and at the same time greatly increasing pick-up volume because the water causes the leaves to pack down. Second, with loader-equipped

trucks, we push the leaves into large stockpiles, then pick them up fast and clean.

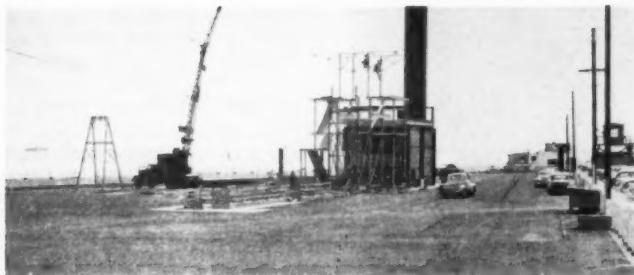
Costs Cut Almost in Half

By eliminating hand labor for shoveling, this method has reduced our leaf-removal costs by almost one-half. In addition, by more than doubling the volume that can be handled in a single truck-load, we have greatly speeded the entire operation.

For other uses, too, we have found the truck-and-loader combination ideal, saving time and cost. We use it to pick up ashes at several disposal points in and near the city, for covering garbage at city dumps and for spreading anti-skid mater-

ial on icy streets in winter. Also we use it to pick up and remove bulky broken concrete and bricks wherever streets have been opened.

Mechanization with the Holmes-Owen loader has been most valuable in the maintenance of city streets and parks especially. Not only is it far faster and cheaper than hand labor for loading and cleaning, but it costs less than any other equipment that will do similar essential work.



• GENERAL view of plant nearly completed, with Pacific Ocean in the background.

Harbor Refuse Disposal in a Large Port

Special incinerator design handles creosoted timbers

M. E. SYLVESTER

TO dispose of its harbor wastes—creosoted and water-soaked timbers, trash, paper, roofing materials, rags and other wastes collected from wharves and docks and removed from harbor waters—the Port of Los Angeles has constructed an incinerator. This is of special design, both to handle the unusual wastes that are collected and to meet the specifications for complete

combustion and elimination of smoke that are required by the Los Angeles County Air Pollution Control District. Authorized early in 1950, this incinerator has been constructed and tested and is now in operation.

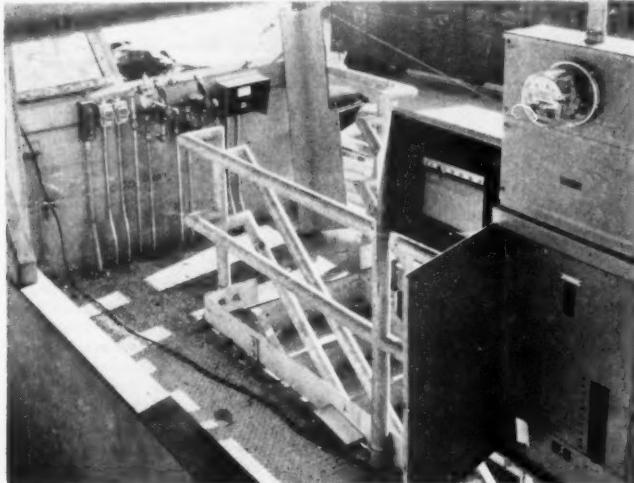
The refuse collected by the Port amounts to more than 500 tons a month. Of this, about 350 tons is wood and the remainder is paper and trash. No organic wastes such as garbage are burned. About 60

per cent of the wood, by weight, consists of creosoted logs and timbers. The design of the incinerator is based on this material having a moisture content of 40 per cent and a creosote content of 16 pounds per cubic foot of wood. These logs and timbers are cut, before feeding into the incinerator, into pieces not in excess of 60 ins. girth and 20 ins. length. Untreated structural timbers, which include sections of pilings, fender logs, planks and large miscellaneous pieces, often spiked or bolted together, also must normally be cut to enter the furnace. Papers, cartons, straw, asphalt roofing, old tires and wood scrap makes up the balance of the material. All of this, totalling about 500 tons per month, as previously stated, is burned in five 8-hour days per week.

Feeding the Incinerator

The bulk of refuse is collected by trucks and each truck load is discharged directly onto a steel apron conveyor, which mechanically conveys the refuse into the incinerator. The heavy timbers are cut before loading into the trucks.

The conveyor is semi-automatic in operation so as to limit its travel after the circuit has been actuated. This regulates the amount of trash conveyed into the incinerator during a given interval. Upon completion of the set loading interval during which the conveyor is ascending, the conveyor will automatically stop



• FROM this platform, operator can control conveyor, grates and burners and watch smoke and combustion record.

—unless previously stopped by the operator, who may release the button controlling the upward movement of the conveyor at will.

The incinerator door always closes automatically after the conveyor halts. However, the operator can resume the operation of the upward movement by merely pushing the "UP" button, whereupon the door opens and the conveyor completes its travel for the remainder of the set interval. The "DOWN" button does not affect the operation of the incinerator door. A 2-leaf gate prevents trash from being dumped into the hopper when the hopper is full.

The steel apron conveyor was installed under separate contract by the Link-Belt Company. It is equipped with side plates five feet in height. A sloping hopper is located under the incinerator end of the conveyor, opening directly into the charging door in such a position as to assure that no trash dropping off the conveyor will become lodged outside the incinerator door.

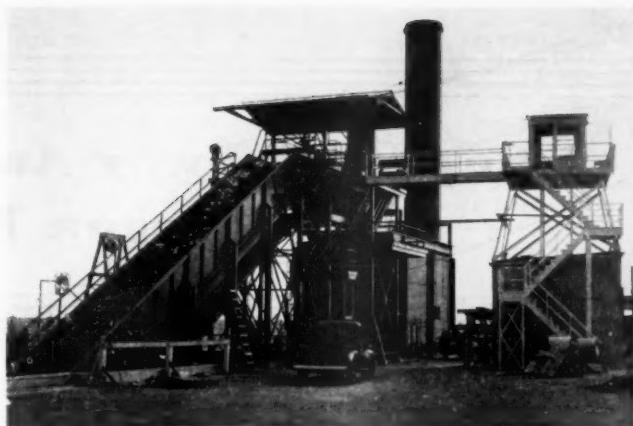
The steel conveyor is constructed of double strand chain to which is attached overlapping apron-type pans of reinforced steel construction capable of withstanding, with safety, a load resulting from being fully loaded with sections of pile butts and heavy timbers. The conveyor pans have an inside width of 7 feet, and are designed to handle the type of trash received spread over the full length of the conveyor to a depth of 5 feet. This is estimated at an average maximum for trash and paper of sixty pounds per square foot of conveyor, and for pile butts of 100 pounds per square foot of conveyor.

A variable speed unit, totally enclosed and running in oil, provides a minimum movement of $2\frac{1}{2}$ feet per minute of conveyor travel and a maximum of 15 feet per minute.

Housing the Furnace

With the exception of the bridge walls and the curtain walls, which are about 13 inches thick, the interior walls of the incinerator are built up of 9-inch, first quality firebrick of high heat duty, non-silicious grade refractory fire clay, laid with high temperature cement.

The outer walls are made of 8-inch high grade hard burned common brick stiffened with angles, ties and channels and braced and buck-stayed to take care of all loads and strains. These walls extend up to the underside of the roof covering.



• ATTENDANT'S tower shown at right. Conveyor belt is loaded with 25 tons of debris for acceptance test.

Outside walls were not bonded to the fire brick lining. Where firebrick was used for the refractory lining, a 3-inch air space was provided between the fire brick lining and the outer wall for expansion and insulation.

The inside ceiling is of cast iron ribs and flat suspended arch construction of individual tiles. The tiles and cast iron hangers are supported by steel beams which, in

turn, are supported by buckstays.

The top of the incinerator housing is covered with corrugated Transite supported by steel roof framing so as to provide a waterproof covering, which has an overhang of 12 inches beyond the outside face of all walls.

The incinerator is equipped with a Brown two-record Electronik strip chart Potentiometer. Two plat-

(Continued on page 118)



• PORTION of test load consisting of 60% miscellaneous trash and untreated wood and 40% of creosoted pile butts.

A Super Highway Amendment to the Oregon Trail

MORE than \$12,000,000 were spent in building the original Oregon Trail some 17 years ago, making it one of the really great scenic highways in this country. Now \$23,962,000 are being spent on

GUY BROWNING ARTHUR

a new and modern Oregon Trail through the 70 miles of the Columbia River Gorge. The old Oregon Trail, road of history, dead-ended where the Cascade Range runs right to the River and breaks



• NEW road near Toothed Rock Tunnel from the old road as it heads into another curve.



• HYDRAULIC fill made this section possible. There was no road and no ground here.



• OLD route shows above tunnel of new road, illustrating great improvement in alignment.



• OVER-PASS at Bridal Veil. Practically all of this section is hydraulic fill.

off in an impassable bluff. A bypass was developed, the Barlow toll road, which came into what is now Oregon City 12 miles south of Portland. It was estimated that in 1845, 300,000 people traveled the Oregon Trail.

Seventy years later came a movement to cut through the gorge and continue the road straight to Portland. With the encouragement of Samuel Hill of the railroad Hills, Samuel C. Lancaster worked out a design for the Oregon Trail. There is nothing anywhere like his achievements of hanging roads around mountain tops. If he missed any breath-taking views, it was mere oversight.

How to Build a Scenic Highway

Here are some feats that would stagger most practical road designers today. From Chanticleer, elevation 925, it was necessary to get down to the valley in 2000 ft. without exceeding 5% in grade. The route selected, "because it commanded a superb view of the river," required cutting half a mile of road out of solid rock, "like a cornice on a building." A little farther along, the road fits the top of a great rock "like the band on your hat," 700 feet up in the air, and traverses 22° of a circle on a minimum radius of 110 feet. He had to build 560 feet of heavy concrete railing four feet high, plus a seven foot sidewalk, to protect the road. Today's tourists will ask why you call any stretch "scenic" if the parapet is so high that you can't see over it.

At Crown Point the road drops from 725 ft. to 60 ft. in four loops in which the road parallels itself five times, always at 5% grade with curve radius never less than 100 ft.

In Oneonta Gorge the highway crosses the stream on a reinforced concrete bridge 80 ft. long, at elevation 44, and plunges into a tunnel 125 ft. long. Only 18 ft. of rock could be left to support the side of the mountain next to the main line railroad tracks, and some fissures in this rock had to be shored up with concrete.

These few examples show the amazing job done at that time and accent the salient changes from this scenic concept of road building to the concept in the present amendment to the famous highway.

R. H. Baldock, Oregon's State Highway Engineer, says in a letter with which he transmitted much material for this article. "It was in-

evitable that an alignment for this highway in keeping with modern requirements, and with the standards for such an important interstate highway, would be adopted. While the engineering problems identified with constructing the modern highway on this route were different from those encountered in the original construction, they were actually much greater. These problems constituted a challenge to the vision, initiative and technique of the engineers, as well as a test for construction equipment and methods."

This paragraph followed one in which Mr. Baldock lauded the designers and builders of the original highway, praising the concept of a scenic highway on this route for those times. So no lack of appreciation for the original highway may be admitted. Times have changed. Highways have changed because conditions and demands have changed.

The Oregon Trail had to Change

The manner of the change is most important. The public asked: Must the state give up one of its major attractions? Should the magnificent scenic highway be turned into a prosaic utilitarian high-speed commercial thoroughfare? Mr. Lancaster, engineer on the original route, bolstered the questioning by saying: "God put more beauty in that 65 miles of the Columbia Gorge than into any other place in the world. It would be unfortunate to mar the handiwork of the Master Builder."

With full respect for that concept, shared by so many, the old route remains on its high man-made benches, through its tunnels, across its graceful bridges, meandering along wild and beautiful stretches, as a scenic route.

The new route is on a water-grade close to the river, away from the heights and their startling straight-up views. The hurrying motorist can leave the leisurely tourist to his domain up there on the precipitous hat bands and cornices, and drive at speeds that suit the modern tempo of business.

To go down close to the river accepted many new problems. Some of the ground on which the road was to be built was non-existent. The fill material could not be taken from the rocky heights, because such borrowing would impair the scenic grandeur of the area. So it was decided to pump material

out of the river bed, though no precedent existed for this method on so large a scale.

In one section 20,269,736 cubic yards were required to make a roadbed, and 10,000,000 yards of this was pumped out of the river. The other half came from deep cuts and grading. The hydraulic filling was done by Hydraulic Dredging Company, Ltd., and the General Construction Company.

Many are beginning to realize that the amendment route has not harmed the scenic beauty of the gorge. Rather, it contributes a new and contrasting beauty of its own. It gives a more intimate view of the river, and makes the sand bars available as bathing beaches and recreation parks. It is becoming



known that the longer view of the numerous waterfalls and timbered heights is an agreeable variation that did not exist for anyone before. Because the face of the gorge faces north, the old route is usually in shadow along the bottom. It is really a somber picture close at hand. From the farther distance the full height is clear, and the sunlit areas toward the top enhance the view.

Construction

From the contractor's point of view the new construction includes some of the most difficult and interesting problems to be encountered in road building. Four noted construction firms are battling slides, huge boulders, peculiarly unstable earth, and unusual weather conditions.

Thousands of feet of detours had to be built, and lightly shot with oil. Traffic used parts of the old route, along with these detours. New work cut under the old route in some places, as well as under some of the detours. With a dry summer season little trouble was expected from slides. We don't expect dry soil to slide.

(Continued on page 108)



• AERIAL view of plant area shows lagoons under construction at upper right of photo.

TREATMENT PROCESSES completely ELIMINATE CYANIDE contents of waste

Charles R. Lose III
American Cyanamid Co.

EFFLUENT disposal at the Fortier Plant of the American Cyanamid Company, presently under construction in Louisiana, follows an established Company policy of attempting to return to the public waterway an effluent as good as the original water withdrawn. This nitrogen chemical plant is located approximately ten and a half miles above the city water intake of New Orleans. The main end product of the plant is acrylonitrile, widely used in the chemical industry, one of the intermediates of which is cyanide. Although the parent company has been engaged in the production of acrylonitrile for a number of years, the new plant has offered new problems due to changes in intermediates with resultant changes in waste effluents.

For several years prior to the selection of the plant site, studies were carried on covering both process operation and effluent disposal. The effluent disposal studies were made at pilot plant facilities where the chemical operations were developed. Additional studies were made at the John Hopkins University under the direction of Dr. C. E. Renn. The Central Engineering Department of the company developed means and methods of treatment resulting from these investigations and studies. The information developed for the control of cyanide can be summarized as follows:

(1) Control by chlorination: It is known that alkaline chlorination will oxidize completely the CN contents of a waste, providing the pH is maintained at 9, a contact period of two hours is provided, and enough chlorine is used to oxidize the CN to cyanates and then to nitrogen and carbon dioxide.

2. Control by aeration: Aeration methods were studied under the following conditions: (a) in an open vessel, with air distributed in large bubbles; (b) in a packed column; and (c) in a closed vessel with the air distributed in fine bubbles. This third method proved to be the most satisfactory, but for practical adaptation to industrial practice, the use of packed columns appears most feasible.

3. Ion exchange is a more costly and less efficient means of removal than some of the other methods studied.

4. Lagooning was found to be practical for partial control but

long storage and large areas are required for substantial elimination.

5. The use of hot air or steam was found to be effective but costly.

6. In low concentrations of CN, river turbidity was effective in reducing the CN content.

The studies leading to these conclusions were carried on at various appropriate plant locations, using both laboratory and pilot plant facilities.

More specialized investigations were conducted at Johns Hopkins University to determine the tolerance of fresh water fish to various concentrations of CN. The fish used were Sunfish, Crappie, Redheart Sunfish, large and small-mouthed Black Bass and Blackhead Minnows. The results obtained indicated that concentrations in excess of approximately 0.1 ppm. of nitrogen as CN could be harmful to some varieties of common southern freshwater fish. It was also found that, as the dissolved oxygen in the water

decreased, the tolerance of the fish is lowered; if the pH increases, fish tolerance to CN increases.

Studies were simultaneously carried on to determine the possibility of a breakdown of cyanide wastes in soil. The results of this investigation indicated that waste with an initial CN content of 100 ppm decreases to about 1 per cent of its original content in ten to eleven days. The soil used in obtaining this result was a mixture of clay-sand and humus.

Developing the Treatment Process

With this information at hand, it was decided that a combination of treatments would be most effective,

lagoon was deemed a necessary and integral part of the plant. It will provide both for surges and for equalization of concentration resulting from spills or leakage.

From the lagoon the waste will be further treated in two steps: (1) automatically controlled alkalinity adjustment; (2) automatically controlled chlorination, using an automatic chlorine residual recorder.

Preventing Escape of CN

The areas in which there are CN-bearing wastes are curbed and paved to insure that no liquid effluent will drain into the rainwater drainage ditches. This gives assurance that such wastes cannot leave the plant site before treatment. Two

waste-collection sumps are provided in each area. One will be for the normal process wastes which at all times will go directly to the storage lagoon. The second line is for the collection of rainwater from paved areas. Rainwater collection lines and pumping facilities are based on a three-inch rainfall per hour for twenty minutes. In other words, all rain in the curbed areas which falls for twenty minutes or to a total depth of one inch, will be piped to the lagoon. At the end of that time, rainwater collection will be diverted to the plant drainage ditches which drain back to the Bayous.

In addition to the wastes bearing CN, two other effluents required treatment. The first was a carbon black effluent containing about 100 ppm of floatable soot. In the original layout for treatment, separators were planned. However, in line with the idea of better treatment at the source, the soot decanters used in the plant processes were enlarged. It was found that all of the separable carbon could be floated in a matter of minutes leaving only a trace of the original. The floatable soot, about four tons per day, will be skimmed from the decanters. If an economic use is not found for this material, it will be buried or burned, whichever appears to be most feasible under plant conditions.

The second waste is a compound having aromatic characteristics,

(Continued on page 120)



• **BUILDING the cofferdam for the pump-house structure. Mississippi River in background; levee at the right.**

economical and practical, considering that in the early phases of the studies the wastes contained as much as 1,800 ppm CN. A preliminary treatment plant was designed which would embody both aeration and chlorination. The idea behind this arrangement was to reduce the CN waste by aeration as far as economically practical and then to continue the destruction of CN by chlorination. In the production of acrylonitrile, aeration is an intermediate step. It was, therefore, decided to enlarge on this step in the process, utilizing increased aeration facilities in the plant instead of larger treatment capacity. The result was an increase in production and a decrease to 1 ppm of CN in the waste. The resulting wastes will be piped to a lagoon which will have a capacity of ten days storage. The



• **COFFERDAM for the effluent discharge structure in foreground. Piling mark course of discharge channel.**

Effects of Loadings and Recirculation Rates on FILTER EFFLUENTS

W. A. HARDENBERGH

and

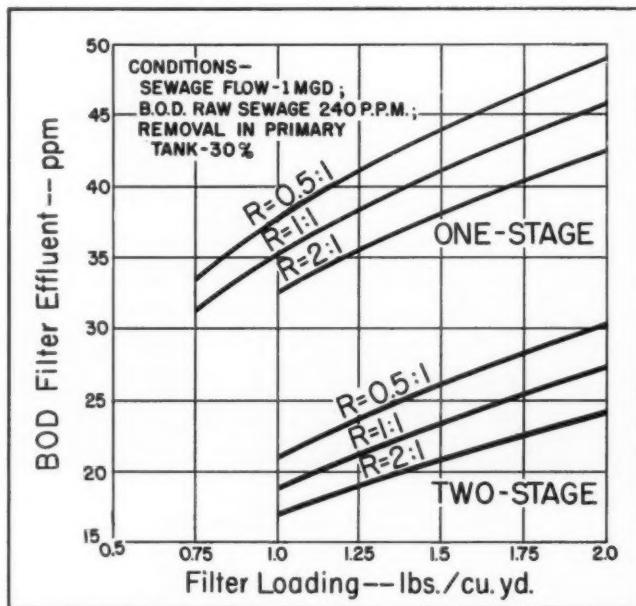
EDWARD B. RODIE,

Editorial Staff, Public Works Magazine

LOADING in pounds of BOD per cubic yard or acre foot of filter media and the ratio of recirculation are the two factors which, in shallow high rate filters, affect most appreciably the quality of the effluent. Of the two, the rate of loading is the more important. Increasing the recirculation ratio may not produce an effluent sufficiently better to justify the added cost resulting from larger sedimentation tank requirements. For instance, with a single stage filter, the BOD of the effluent will be reduced only about 5% by an increase in recirculation from 0.5 to 1.0, while the size of the primary sedimentation tank must be increased by one-third; and in some designs, the secondary settling tank capacity must also be increased.

With a two-stage filter, the improvement resulting from an increase in the recirculation ratio will be a little greater. For instance, a two-stage filter with an applied loading of 1.75 pounds of BOD per cubic yard will, with a recirculation ratio of 1.0 produce an effluent some 10% lower in BOD than will be produced by a recirculation ratio of 0.5. These estimates are based on a raw sewage strength of 250 ppm BOD with 30% removal in the primary.

Whether or not the additional cost resulting from the greater clarifier capacity required by the higher recirculation ratio is justified depends on local conditions but appears doubtful in many cases. Actually, such a degree of BOD reduction is possible by the use of two-stage filters that most conditions can be met by their use with



• EFFECT of recirculation on high rate filter effluents.

a low recirculation ratio. If a better effluent is required than can be obtained by such treatment, consideration should probably be given to the use of effluent filters.

Other Considerations

Complete treatment of sewage costs embarrassingly large sums of money. Anything that will reduce these costs while not reducing the efficiency of the treatment process should be given serious consideration. Some of the requirements of state boards of health appear to be unrealistic and of questionable value when secondary treatment of a high quality is to be provided. One of these requirements is the very low outlet weir overflow rate, pro-

vision for which in some types of settling tanks costs a considerable amount. The authors know of no evidence that such low outlet overflow rates have any effect at all on filter performance and it appears that this requirement is very questionable for primary tanks where secondary treatment is provided.

Another factor of importance from the cost viewpoint is the size of the settling tanks, especially the primary tanks. There is some experience to indicate that shorter settling periods than are normally required will be satisfactory ahead of high rate filters. R. J. Ellison and Randolph L. Smith in an article in this magazine (August, 1951) stated that very small primary tanks have

given better results in the North Central States where milk and animal packing wastes must be treated. Their experience has been that the primary clarifier need remove only material that cannot be handled by the microbial forest of the filter. At least two plants in the east, Ridgewood, N. J., and Liberty, N. Y., have much shorter than normal primary detention yet are producing superior effluents.

Filter Efficiency

The data presented below on filter performance are computed by the method developed by the sub-committee on Military Sewage of the Sanitary Engineering Committees of the National Research Council. This report, which was published in *Sewage Works Journal* for Sept., 1946, presents equations which may be used to compute the recirculation

organic loading of pounds of BOD per unit of effective filter volume.

The per cent efficiency of BOD removal in a trickling filter and accompanying clarifier is expressed by the equation:

$$E = \frac{100}{1 + .0085 \sqrt{L}} \quad (2)$$

Where L is the unit organic loading.

Illustrative Examples

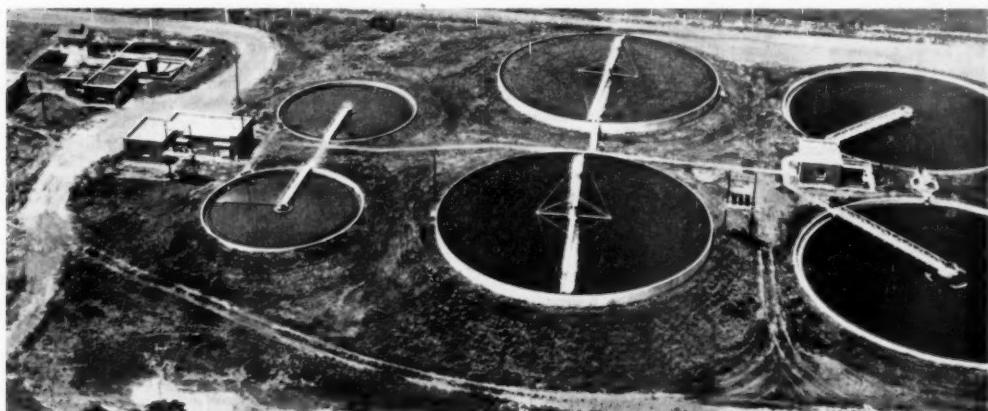
The general assumptions used in the problems worked out below are as follows: Sewage flow 1 mgd; raw sewage BOD 240 ppm; total BOD 2,000 pounds; removed in primary settling tanks 30%; applied to filters 1,400 pounds.

SINGLE STAGE FILTERS: With a BOD loading of 1.75 pounds per cu. yd. of filter media, the required

or 168, the final BOD is 168×0.263 or 44.2 ppm.

If the loading is reduced to 1.5 pounds per cubic yard, the filter volume is 930 cu. yds., or 0.577 acre-foot. By the above formulas, the efficiency of BOD removal is 75.2% and the BOD of the effluent will be about 41.7 ppm. If the loading is still further reduced to 1.25 pounds per cubic yard, the filter volume is 1,125 cu. yds., or 0.695 acre-foot; the efficiency of removal is 77.1%; and the final effluent BOD is 38.5 ppm.

To determine the effect on the final effluent of reducing the recirculation ratio, the above computations will be carried through with a recirculation ratio of 0.5. The recirculation factor becomes 1.36 and, for the loading of 1.75 pounds of BOD per cu. yd. of filter volume: $1,400 \div (0.5 \times 1.36) = 2,060$, and the efficiency of the filter is:



Courtesy Dorf Co.

• WASTE treatment plant includes two clarifiers, two filters, thickener and digester.

factor and the efficiency of trickling filters. Experience since 1946 has indicated the validity of the formulas.

The recirculation factor of organic material in sewage will be lower than the recirculation ratio since part of the organics are removed in each pass and are not available for subsequent recirculation. For a recirculation ratio R, the recirculation factor F is determined by the equation:

$$F = \frac{1 + R}{(1 + 0.1R)^2} \quad (1)$$

The volume of filter media is multiplied by F to determine effective filter volume. All computations of filter efficiency are based on the

volume of the filter will be $1,400 \div 1.75$ or 800 cu. yds.—approximately 0.5 acre-foot. Assuming a recirculation ratio of 1 to 1, the recirculation factor by formula (1) is 1.65 and the organic loading is $1,400 \div (0.5 \times 1.65) = 1,700$.

This value of the organic loading is substituted in the efficiency formula (2) and the efficiency determined:

$$\frac{100}{1 + .0085 \sqrt{1700}} = 73.7\%$$

This is the BOD reduction through the filter and the accompanying secondary clarifier. Since the BOD of the primary effluent is 240×0.70 ,

$$\frac{100}{1 + .0085 \sqrt{2060}} = 72.3\%$$

With this recirculation rate and filter loading, the final effluent will contain 168×0.277 or 46.5 ppm BOD. This compares with 44.2 ppm when using the 1:1 recirculation ratio. Similarly, with a loading of 1.5 pounds per cu. yd., the effluent BOD will be 43.9 ppm; and with a loading of 1.25 pounds, it will be 41.2 ppm. These data, along with the required filter volume are shown in the diagram.

The above loading and computations have been given mainly in pounds of BOD per cu. yd. of filter
(Continued on page 98)

MACHINES

DO THE WORK FASTER AND CHEAPER



GETTING THE JOB DONE AT A PRICE YOU CAN AFFORD AND IN THE TIME YOU CAN ALLOW

OUR LARGER installations of pipe lines are done by contract, as are other major projects. The primary equipment items we have are a Novo sump pump, Ridgid die sets and threaders and Smith welding equipment, in addition to the usual hand tools.—L. L. Roberts, Superintendent, Baldwin Park, Calif.

WE USE a trencher for digging for water mains, a boom tractor for lowering the pipe into the trench; and a bulldozer for backfilling. Also, a well drilling rig.—Guy B. Cornel, Sup't., Water Dep't., Crocker-Huffman Land & Water Co., Merced, Calif.

A CONCRETE SAW, made by the Cutcrete Corp., has been used since the beginning of 1952 for cutting all types of pavement. Prior to that time we used compressors and cutting tools. A crane is employed for handling cast iron pipe.—George S. Dodge, Secretary, Montebello Land & Water Co., Montebello, Calif.

PIPE LINE construction has been greatly facilitated by our new Hough Payloader, and by our Jaeger pump. We expect to lay 10-, 250 ft. of pipe this year, of which 2,400 ft. will be 16-inch or larger.—J. A. G. Russell, Div. Engr., California Water & Telephone Co., San Marino, Calif.

A SCHRAMM pneumatractor was purchased recently which is equipped with a front end loader and an Ottawa backfill blade; also a LeRoi Cleveland clay spade and backfill tamper, with a 58-lb. concrete breaker, including mauls, clay spades, etc. Inasmuch as these were purchased very recently we have not used them much. We plan to dig up and raise all valve boxes where streets have been paved. We are going to make a rig to slip around the

valve box upper section, and attach this to our hydraulic front end loader. This ought to eliminate the necessity of digging deeply, with less dirt to disturb and less to tamp. We are also going to get a small boom attachment to give us more height and reach so that we can use our Pneumatractor to set pipe into the trench.—Jerome S. Grutza, Superintendent Water Department, Aurora, Colo.

USEFUL EQUIPMENT during the past year included a portable pump for dewatering sewer and water line ditches; a tapping machine for inserting connections for service lines under pressure; and a pipe pusher to put lines under hard-surfaced streets without tearing them up.—M. H. Phillips, Superintendent, Paragould, Ark.

THE SHERMAN power digger proved very successful and economical in installing water mains up to 10-inch. An average of 250 to 300 ft. per day can be dug and backfilled. We have installed 6-inch and 8-inch pipe at an average cost of 50 cents a foot, not including the cost of the pipe.—Cecil A. Brown, Local Manager, Pine Bluff, Ark.

A DRAG LINE was used to remove 6,000 cubic yards of gravel and sand from a creek for road stabilization. This enabled us to get our unpaved streets in good condition so that there were no complaints of mud during the past winter. We also used calcium chloride and found it most helpful on unpaved streets, especially those that had been stabilized with sand. The streets that were treated have remained surprisingly smooth with merely light grader treatment occasionally. Of course, the treatment eliminated dust; also these streets seem to show less erosion, due, per-

haps, to the good crown. Property owners paid for the calcium chloride. I hope that this year the Town Board will share the cost of chemical so that more extensive use will be possible. It appeared that the reduction in maintenance cost would more than pay for the chemical.—F. G. Doggett, City Engineer, Mt. Airy, N. C.

WE USED a 1/3-yd. Badger backhoe mounted on a surplus White half-track to excavate a sanitary sewer trench 13½ ft. deep. For backfilling, we used a Caterpillar D2 tractor with bulldozer attachment.—C. M. Brock, Water Sup't., Cleveland, Miss.

INSTALLED treatment equipment includes a Permutit precipitator cold lime softening equipment, an Omega lime slaker and feeder, a Lamson pneumatic materials handling system, a General Electric photocell turbidity control unit and a Homelite electric sludge removal pump. We use activated carbon for the control of oil pollution.—Nelson M. Fuller, General Superintendent, Batavia, N. Y.

WE DO ALL of our construction work with our own equipment. This includes two graders, one air compressor, one road roller and one concrete mixer, which we use for mixing concrete and for mixing bituminous patch material for our streets.—I. T. Jesse, Town Manager & Treasurer, Richlands, Va.

WE HAVE A Quickway 2/5-yd. shovel mounted on a truck which we use for excavating for water and sewers; also a Hough Payloader which we use for backfilling and loading materials, as well as handling pipe, valves and hydrants into the trench. We use a portable welder for welding steel pipe and for repair work.—Paul H. Meyer, Water Sup't., Walla Walla, Wash.



• **LARGE culvert was built to meet a difficult flooding problem in Mesa Co., Colorado.** R. R. Weimer is Road Supervisor

FASTER, BETTER and lower cost trenching than ever before has been possible with a small ditcher mounted on a Ford tractor, with a bulldozer blade. We use this on small mains and services.—J. H. Oglesby, Water Sup't., Pecos, Texas.

TO MY MIND, our Little Giant pipe pusher has been our most effective piece of equipment. We pushed 22 service lines underneath a state highway in 8 days and made all taps and connections, thanks to this pusher.—A. W. Moyer, Water Works, Sup't., Rittman, O.

DURING THE PAST year our most effective equipment was a detector for finding leaks under pavements and floor slabs. Secondary mention should go to our chlorine residual recorder at the filter plant; and third mention to our 600-pound a day chlorinator.—George J. Van Dorp, Commissioner of Water, Toledo, O.

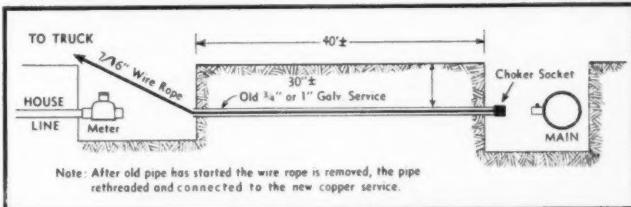
EQUIPMENT FOR pipe line construction was hired. Using a backhoe for excavating the trench and a bulldozer for backfill, we dug about 3,000 ft. of trench, 5.5 deep and 2.5 ft. wide for approximately 15 cents a lineal foot.—Fred F. Parker, Sup't. & Director, Water Dep't., Hanover, N. H.

OUR EARTHWORM boring machine has cut down time on installing long services about 10 man-hours per service. We use this for drilling under streets and roads for new services. It is operated by a small gasoline engine and is a rotary drill, the drilled dirt being washed out of the hole.—David L. Wills, Sup't. of Distribution, Oakmont, Pa.

For backfilling, we bolt two 4-in. by 6-in. blocks together over the teeth and the backfill is either pushed or pulled into the trench. We also use the bucket as a hoist for setting valves and hydrants or to lift pipe into trenches in awkward situations. This digger is mounted on a Ford tractor. We expect to lay about 10,000 ft. of pipe this coming year.—Walter Turner, Sup't., Water Department, Cambridge, Ohio.

OUR MOST effective equipment, probably, is our Chevrolet truck, 1½-ton, flat bed, equipped with a tripod and power winch. It is used to lower water pipe into trenches, remove and replace hydrants, and for removing grit from the bottoms of basins at the sewage treatment plant. It was used last year to pull debris away from the piers of several bridges following high water. The tripod can be removed and the truck used for normal purposes. Such equipment is valuable for a department of our size.—W. R. Bowman, Sup't. Water & Sewage Treatment, Newark, O.

FOR SMALL-TOWN water main work, the Sherman power digger fills a long-felt need. In some cases it constitutes almost a one-man crew. We ordinarily do not work on Saturdays, but often we send the digger out on Saturday morning to backfill trenches dug previously. This digger is effective to a depth of 5 ft. (we have the smaller size).



A Better Method of Replacing Services

GLENN D. BOWEN,

Manager, Oregon Water Corp.,
Klamath Falls, Ore.

In replacing galvanized services, which have rusted out and are leaking, with copper tubing (Type K), the usual practice is to pull or jack out the old galvanized pipe after connecting the new copper tubing to the old pipe. The pulling connection is made directly to the old pipe. This system works very well if the old pipe will start without breaking off. Generally, if the pipe can be started, the remainder of the replacement is easy.

When the old service will not move or if we expect it to pull unusually hard, we run a piece of 7/16-inch wire rope, equipped with

a choker socket, through the pipe. Using wire rope clips, we attach the rope to our winch truck line. We sometimes use a single block in the connection. If, after applying considerable tension, the pipe does not move, we strike the end of the choker socket with a sledge hammer. This will usually start the pipe.

When a pipe cannot be started by any of these methods, we try to start the pipe splitting, usually at the weld, so the choker socket will pull through the pipe. After splitting the first length (usually 21 ft.) the choker socket will hang up at the coupling and the remainder of the pipe will usually pull out. A wire should be kept attached to the choker socket so it can be pulled out backwards, if necessary.

If this system fails, we cut the pavement and dig.

OUR AUSTIN-WESTERN backhoe is the best piece of equipment we have and saves the most man-hours. I made a steel plate to fit on the front of this backhoe to fill trenches after the pipe was laid. The plate is 4 ft. long by 22 ins. wide. With this plate, the backhoe is not as fast at backfilling as is a bulldozer, but it saves that piece of equipment.—Russell Davison, Sup't. of Water & Sewers, Plattsburgh, Wisc.

WE BUILT a boom on the A-frame of a TD14 tractor, after taking the bulldozer blade off, and used this unit for unloading 16-in. Universal pipe from a scow. This carried 17 lengths of pipe at a time, and was hauled by the tractor. Arriving at the place where the pipe was needed, the scow was unhooked and the tractor distributed the pipe along the line. We hauled 5,800 ft. of pipe in eight days with two men, hauling 102 ft. of pipe to a load, with the longest haul a little over a mile and across 1,300 ft. of swamp. The scow was all steel except the floor, which was 3-inch hardwood plank. The sides were steel angles with plank that we could lift off so as to get the hooks into the pipe ends for unloading. This line replaced a 16-inch wood stave pipe laid in 1916.—Wm. G. Hartwell, Sup't. and Treasurer, North Anson Water District, North Anson, Me.

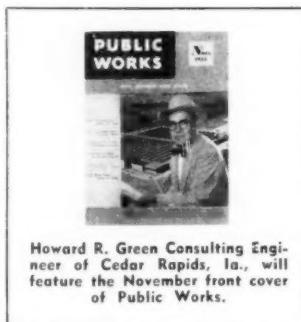
WE LAID 14,000 ft. of 30-inch prestressed concrete cylinder Lock Joint pipe, the work being done by contract by A. P. Wyman Co., Inc. Other work included increased reservoir capacity and construction of a 30-inch intake pipe into China Lake, with a new intake well and screen chamber. In 1952, we will spend about \$97,000 on replacement of old mains with larger pipe, new meters and hydrants.—J. Elliott Hale, Sup't., Water Department, Waterville, Me.

OUR MOST useful equipment was a small backhoe attached to a Ford tractor. We used this for trenching and filling for service pipe installations, and for mains even up to 6 ins. in diameter. It proved to be a great help to this small department in saving time and money.—Wilbert Locke, Water Dep't. Superintendent, Lancaster, Mass.

OUR MOST complicated job was the installation of a new 1,100 gpm

electric, gasoline auxiliary, pump. Installing this necessitated cutting into the feed line and installing a new feed line to the new pump. Except for a crawler shovel, we used only some pumps. Fullers earth was found and we pumped a large part of the excavation out with a suction and force pump.—James Williams, Sup't. of Public Works, Stoughton, Mass.

WE CONSTRUCTED a cathodic protection system for our elevated tank, using the information given in the Nov., 1951, issue of *Public Works*.—Henry J. Harvill, Manager of Utilities, San Benito, Texas.



Howard R. Green Consulting Engineer of Cedar Rapids, Ia., will feature the November front cover of *Public Works*.

ALL OF OUR filter equipment had to be operated effectively to attain rated capacity. When I took charge about a year ago, our filter sand was so encrusted that the effective size was about 2.0 mm as compared to the original 0.4 mm. We have replaced the filter sand and are now planning to install two new radial flow type basins and to change the existing basins from cross-flow to radial flow. The next step will be to increase our filters from 10 units of 4 mgd each to 16 units. A third stage of improvement involves a 9-mile pipe line to another reservoir to increase our supply from 30 to 60 mgd. A new water pump has been installed and a high service pump is being installed now.—Merrill L. Riehl, Sup't. of Purification, Youngstown and Niles, Ohio.

WE COMPLETED laying 55,000 ft. of pipe, 4 to 12-inch, and this will be adequate for a number of years. We used a Cleveland digger, Jaeger air compressor, Caterpillar tractor, a truck with an A-frame and a Ford F-6 winch truck.—Jack G. Walcott, Water Superintendent, Alva, Okla.

PUBLIC WORKS for October, 1952

ON A JOB of laying 18-in. cast iron pipe in 16-ft. lengths, we used a ½-yd. backhoe for trenching and another like machine with a crane boom to unload and place the pipe. On a sewer job, we used well points to dewater a sewer pump well 25 ft. deep with water table of 4 ft. and 10 ft. of running sand. On a sewer job involving 30,000 ft. of 8 to 15-inch sewer, we used GK joint compound, except in extreme wet trench where we used a cement diaper joint. We used 8,000 linear feet of 4 by 8-inch sound yellow pine bottom or foundation plank where the trench bottom was not sufficiently firm to make a good foundation. Each vitrified clay pipe was supported with four 2 by 6 by 12-inch wedges. About 12,000 ft. of this line had to be well-pointed and sheeted.—T. C. Robinson, City Engineer, Georgetown, S. C.

OUR FILTRATION plant is rated at 2 mgd and has four filters, one mixing chamber, two settling tanks and a 200,000-gal. clear well. There are three dry feeders, one for alum, one for aluminate and one standby. Two chlorinators are installed, one of which is standby. We use activated carbon in the summer for taste and odor control, the carbon being added at the aerator, which we find works well.—Lyle Meadows, Sup't. of Water Works, Watertown, S. D.

REMOVAL OF SAND and grease from our sewer lines has been accomplished very successfully with our Flexible sewer rod equipment, powered with a Briggs & Stratton engine. We first run the auger through the line, then remove it, attach the porcupine and pull back through the line.—W. E. Sealy, Sup't. Water & Sewers, Lamesa, Texas.

FM RADIO communication for emergencies and for distribution system maintenance is very useful. Besides 2-way equipment in cars and trucks, we have three land stations, one at each filter plant and one at the Penn Ave. pumping station, which is the relay station (rebroadcasting by voice) from cars or offices to other cars or points. There are also 3 monitors in the homes of key personnel of the distribution system. There are 22 receivers in cars, most of which are used in distribution system work.—Frank Herrman, Office Engineer and Designer, Oklahoma City, Okla.

VICE PRESIDENTS MILTON OFFNER EDWARD P. DECHER RALPH C. GRAHAM WARREN A. COOLIDGE	OCTOBER 1952 <h1>APWA</h1> <h2>news</h2> 	DIRECTORS J. J. DEAN SOL ELLENSON GEORGE O. HYLAND JEAN L. VINCENZ
ALLEN H. ROGERS, President		DONALD F. HERRICK, Executive Director

ELSEWHERE in this issue of Public Works (see page 7) you have no doubt read the formal announcement of certain new arrangements made between Public Works Magazine and the American Public Works Association for a closer cooperative program in the public works field. It is sincerely hoped, that through the facilities offered, this extension of the Association's program to a broader field will be beneficial to men engaged in city, county and state public works activities. This October issue launches the Association into such an expanded program.

Local Congress Committee Sets Record

The 1952 Public Works Congress and Equipment Show held in Los Angeles was the largest in the history of the Association, both in registered attendance and in the number of exhibitors taking space. With a total registration of over 900 and with 79 exhibitors displaying their products it was the outstanding event of the year for public works people. Special tribute is due the local Congress Committee, headed by Harold W. Nash, President of the Board of Public Works, Los Angeles, for a splendid job in arranging the Congress and to the many firms taking exhibit space.

Of particular interest and importance to everyone engaged in the public works field were the symposiums conducted on four phases of public works activities. Led by A. M. Rawn, Chief Engineer and General Manager, County Sanitation Districts of Los Angeles County, the opening symposium was a discussion covering "Action on the Pollution Abatement Front". The "Federal Program of Action" was presented by Carl E. Schwob, Chief,



Outgoing President Cleary turns over gavel to Allen Rogers, the new president.

Division of Water Pollution Control, Public Health Service and "Interstate Developments" by Edward J. Cleary, Executive Director and Chief Engineer of the Ohio River Valley Water Sanitation Commission. Completing the panel was Vinton Bacon, Executive Officer, State Water Pollution Control Board of California, who discussed current "State Activities" on the problem.

The second panel was assigned the topic of "Subdivision Controls", a matter of vital interest to all public works people. Moderated by Charles B. Bennett, Director, Department of Planning, Los Angeles,

the problem of "Improvement Financing" was presented by L. G. Apperson, City Engineer, Portland, Oregon, while the discussion on the establishment of "Improvement Standards" was led by Harry H. Shatto, Director of Public Works, Hayward, California. Andre M. Faure, Planning Director, Tucson, Ariz., presented the various ways in which the necessary "Planning Integration" of the whole problem could be accomplished.

The third symposium was concerned with the serious problem of "Improving Employee Performance". O. W. Campbell, City Manager, San Diego, California, was moderator of the session and called upon Samuel E. Vickers, City Manager, Long Beach, to discuss the "Administrative Training" phase of the problem while William K. Smith, State Training Officer, California State Personnel Board, presented the procedures and methods for "Training the Supervisor". The third portion of the general topic, "Employee Training", was discussed by Robert C. Ferderer, Personnel Director, Minnesota State Highway Department.

The fourth and last panel discussion was devoted to "Public Works



● OUTSIDE equipment display at the Public Works Congress.



Inside exhibits were located in the Shrine Convention hall.

Financing" Guided by Samuel M. Roberts, Director of Finance, Long Beach, Calif., as moderator, the subject was presented in four functional sections. The "Service Charge" method of financing was presented by Myron Tatlock of the consulting engineering firm of Ralph L. Woolpert Company, Dayton, Ohio, while "General Tax Levies" was discussed by John R. Massen, Assistant to the City Manager, San Jose, California. Stephen B. Robinson, Attorney, Los Angeles, presented the "Borrowed Funds" technique of public works financing. The "Special Assessment" methods were discussed by Lewis M. Wrenn, City Engineer and Director of Public Works, Pontiac, Michigan, from a paper previously prepared by Theodore D. Moss, Director of Public Works, Flint, Mich., who was unable to attend the Congress because of illness.

One of the highlights of the Congress was the paper, "Cities' Interest in Water Resources", presented the final morning by Samuel B. Morris, General Manager and Chief Engineer, Department of Water and Power, Los Angeles, and one of the country's outstanding experts on water development problems.

The annual proceedings of the 1952 Congress will be published by the Association in the near future and all of the discussions presented in the symposiums and panels will be included in this volume. Complimentary copies of the proceedings will be sent to APWA members requesting them.

Something New

This year inaugurated a new type of informal discussion groups which were named "What's Your Question"

tables. Twelve tables were set up with each table staffed by three or four experts on the particular subject assigned to that table. The general topics were Parking Facilities and Traffic Controls; Street Maintenance; Street Lighting; Public Relations; Refuse Collection; Street Construction; Street Sanitation; Refuse Disposal; Snow and Ice Control; Organization and Personnel; Work Safety; and Drainage. All tables ran concurrently and all



Walter N. Frickstad received honorary membership in APWA

could go from table to table asking their questions of the experts at each table. First reports indicate that all liked the idea and it is expected in the future this type of informal discussion will be continued but with more care being used in the selection of locations for tables in order to eliminate disconcerting noise which prevailed this year.

The entire afternoon of the closing day was devoted to inspection trips covering some of the most important of public works activities

in the Los Angeles Area. Delegates were given their choice of three trips planned by the Local Committee: The Hyperion Sewage Treatment Plant, the City of Glendale Incinerator or the Los Angeles-Hollywood - Pasadena Freeways. Some three hundred public works people took advantage of this opportunity to see these operations.

Some Fun Too

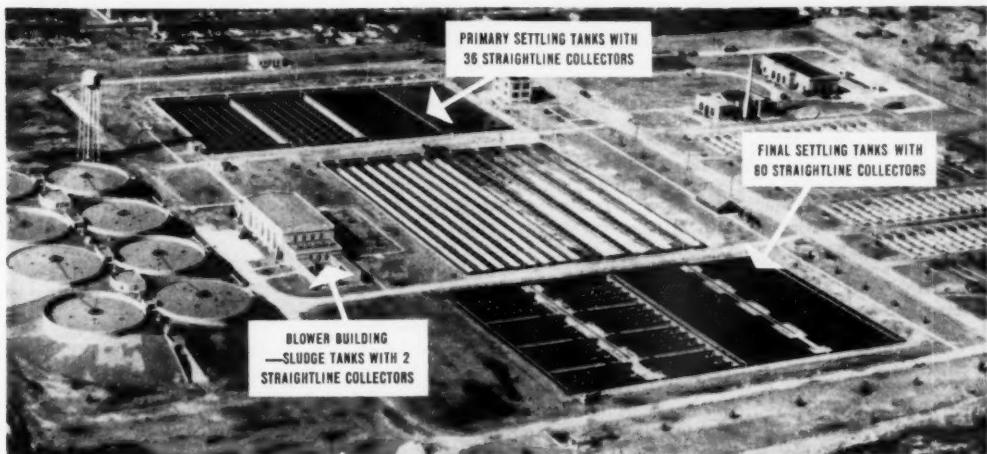
Congressionaires took to the social events as bees take to honey. Record attendance at each event proved that the splendid entertainment program received enthusiastic applause. Opening with the Get-Acquainted Party in the South Gardens of the Ambassador Hotel, hundreds enjoyed the warm Hawaiian welcome extended by the ladies of the Local Committee and the resultant informality which prevailed throughout the evening. The Spanish Barbecue on Monday evening was no less popular. Close to 800 people jammed Griffith Park for the specially prepared beef and all the trimmings, followed by an outstanding review presented by radio, TV and motion picture stars.

On Tuesday noon, delegates to the Congress were guests of the local committee at a buffet luncheon held on the balcony of the Shrine Convention Hall, and on Wednesday evening to bring to a close the Congress and the social events, four hundred men and their ladies gathered at the annual dinner in the Embassy Room of the Ambassador Hotel to witness the presentation of awards, the installation of the new president and to hear Boyce House tell how he took Hollywood by storm.

Samuel A. Greeley Service Awards

Twenty-one men were honored at the annual dinner of the Association when they received the Samuel A. Greeley Service Award. This particular award was established in 1930 by Samuel A. Greeley and Hansen, Consulting Engineers, Chicago, for the purpose of honoring public works men for long and faithful service to their communities. To be eligible for the award a person must have given thirty or more years continuous service in the employ of his city or community and must have been a member of the American Public Works Association for at least five years. Those receiving this honor this year were:

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Sixteen final settling tanks at new Philadelphia sewage treatment plant are equipped with 64 longitudinal and 16 cross Link-Belt Straightline Sludge Collectors. The two sludge storage-concentration tanks also have Straightline Collectors.

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Thomas F. Whalon, Asst. Engineer, Assigned to Refuse Disposal, Chicago, Ill.; Grant E. Taylor, Deputy Street Commissioner, Toronto, Ont., Canada; James C. Sansom, Equipment Superintendent, Montgomery, Ala.; Ralph Michel, Associate Traffic Engineer, Chicago, Ill.; Elmer W. Prince, City Manager and City Engineer, Morgantown, W. Va.; J. Fred Price, County Highway Engineer, Monroe County Road Com., Monroe, Mich.; John E. Mornell, Secretary, Sewerage and Water Board of New Orleans, New Orleans, La.; James J. Leahy, Supt., Streets and Sewers, University City, Mo.; Joseph W. Kales, Town Engineer, Belmont, Mass.; W. O. Jones, City Manager, Fort Worth, Tex.; Adam Jenney, Street Commissioner, Perth Amboy, N. J.; Herman Hiltzsch, City Engineer, Fullerton, Calif.; William H. Droege, Supt., Chemical Asphalt Plant, Fort Wayne, Ind.; Merrill Butler, Deputy Engineer, Bureau of Engineering, Los Angeles, Calif.; Harry S. Bronson, Ramsey County Engineer, St. Paul, Minn.; Arthur L. Boscow, Supt. of Streets, Piedmont, Calif.; Sidney B. Barnes, Senior Site Planner, Philadelphia, Pa.; August E.

Zentgraf, Engineer in Charge, Bureau of Surveys, Newark, N. J.; J. A. Williams, Supt. of Public Works, Glencoe, Illinois; William R. Wooten, City Engineer & Director of Public Works, Tulsa, Okla.; J. J. McNeill, Supt. of Streets, Montgomery, Ala.

Charles Walter Nichols Award

To John W. Hood, Supt. of Sewage Treatment, Ridgewood, N. J., goes the distinction of receiving the 1952 Charles Walter Nichols Award consisting of an honorarium of \$500 and an award certificate. This award was established in 1950 by Charles Walter Nichols, Chairman of the Board, Nichols Engineering and Research Corporation, New York City, for the purpose of recognizing outstanding meritorious achievement in the field of municipal sanitation including street sanitation, refuse collection and disposal, sewerage and sewage treatment and water supply and treatment. To be eligible the recipient must be an active member of the Association and engaged in full time employment by a municipal government. Mr. Hood was selected for this honor "for his consistent leadership over many years

in the development, operation, and management of sewer and sewage treatment facilities in Ridgewood and particularly for his pioneer work in root control in sewers by use of copper sulphate, sewage filter fly control and control of sewage treatment process efficiency by oxidation-reduction potential."

The Honorable Mention Award Certificate was presented to Carl Schneider, consulting engineer, Department of Sanitation, New Orleans, La., "for his pioneer work and studies in determining the early advisability of refuse to be used for filling material that had been previously placed in sanitary landfills and particularly for the economic implications of his research findings."

Equipment Show

With 79 manufacturers and distributors and others exhibiting more than \$1,000,000 worth of public works equipment, the 1952 Show was the outstanding event of this kind this year. Cranes, graders, shovels, rollers, refuse collection equipment, trucks, sweepers, were only a few of the many types of public works equipment shown. Some 85,000 square feet of exhibit

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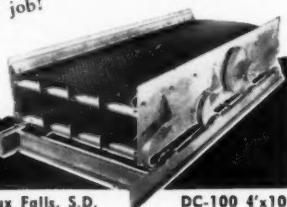
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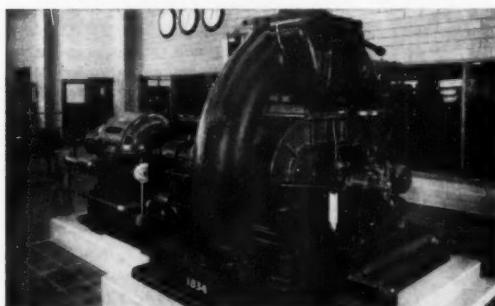


NEW YORK CITY CHOOSSES

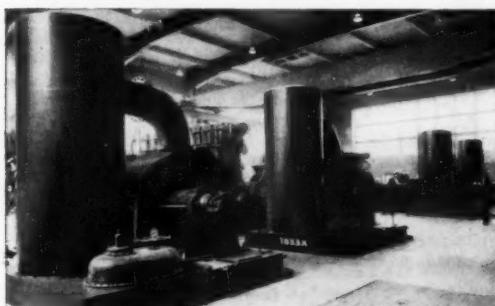
R-C dual-ability



Owls Head—4 Centrifugal Blowers, each of 15,000 cfm capacity, driven by direct-connected motors.



Rockaway—2 Dual-Impeller Rotary Blowers, each of 3000/2000/1000 cfm capacity, driven by direct-connected motors.



Hunts Point—4 Rotary Positive Blowers each of 21,000 cfm capacity, driven by diesel engines.

The first Roots-Connersville Blowers for New York City sewage treatment plants were installed at Tallmans Island in 1939. At present, of eight operating, activated sludge plants, five are totally equipped, and one is partially equipped, with R-C Units, selected from the *dual-ability line*. These include engine-driven and motor-driven Rotary Positive Blowers, motor-driven Centrifugal Boosters, Gas Pumps and many R-C Positive Displacement Meters.

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Owls Head—1952
3—Rotary Gas Pumps
4—15,000 cfm Centrifugal Blowers
2—Low-Pressure Rotary Blowers

Jamaica—1943
3—15,000 cfm Centrifugal Blowers
12—Positive Displacement Meters

Rockaway—1952
2—3000/2000/1000 Dual-Impeller Rotary Blowers

26th Ward—1951
1—20,000 cfm Rotary Blower (moved from Tallmans Island)

Hunts Point—1952
4—21,000 cfm Rotary Blowers
9—Positive Displacement Meters

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space filled with the newest equipment made the show a most interesting and worth while event for every public works man attending the Congress. The Seabees from the Naval Construction Training Center, Port Hueneme, Calif., were on hand with a fine exhibit of equipment and devices they use in training.

Allan H. Rogers Elected President

Election returns of the mail ballot conducted prior to the Congress indicated the new officers and di-

rectors of the Association for 1953 to be:

President — Allan H. Rogers, Superintendent of Public Works, Garden City, N. Y.

Vice President—Eastern Area—Edward P. Decher, Secretary and Purchasing Agent, Joint Sewer Commission, Newark, N. J.

Vice President—Central Area—Ralph C. Graham, Superintendent of Construction and Public Works, Davenport, Ia.

Vice President—Southern Area—Warren A. Coolidge, Director of Public Works, Nashville, Tenn.

PUBLIC WORKS for October, 1952

Directors at Large—George G. Hyland, Commissioner of Public Works, Boston, Mass.; and Jean L. Vincenz, Director of Public Works, San Diego County, San Diego, Calif.

Treasurer—Albert G. Wyler, City Engineer, New Orleans, La.

Those officers and directors holding over for another year are Vice-President, Western Area, Milton Offner, Secretary, Board of Public Works, Los Angeles, and Directors at Large, Sol Ellenson, Director of Public Works, Newport News, Va., and J. J. Dean, President, Dean Engineering Company, Albany, Ga.

Immediate Past-President is Edward J. Cleary, executive director and chief engineer, Ohio River Valley Water Sanitation Commission, Cincinnati, Ohio.

Frickstad Honored

The Association's highest honor, Honorary Membership, was bestowed upon Walter N. Frickstad, retired City Engineer of Oakland, California, and at present district engineer for the California Joint Highway District. The Board of Directors recommended to the members of the APWA that Mr. Frickstad be considered for this honor and by unanimous vote the title of Honorary Member was conferred upon him at the annual business session.

* * *

Equipment Speeds 33-inch Sewer Construction

In laying the 33-inch sewer which will connect the Lackland Air Force Base and Kelly Field with the sewer system of the city of San Antonio, Tex., equipment was used to speed the work. The contractor, Henry Stich, used a Bucyrus-Erie 15-B crane to lower the pipe into the trench and two International TD-14A crawlers with Bucyrus-Erie bulldozers and a Hough Payloader for backfilling. The sewage will be metered and payment made to the city on that basis.

* * *

Dogging Water Department Employees

The interest of dogs in water departments is not confined to fire hydrants. Of the 326 "accidents" to the 1450 employees of the Detroit Department of Water Supply 5% were reported as "dog bites." An occupational hazard, we suppose, of meter reading.



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Extent of Water Supply Fluoridation

Fluorides were being added to the water supplies of 214 cities, as of July 7, 1952, according to the American Municipal News. These fluoridated supplies serve a total of 4,792,231 people. In addition, there were 1,401 water supplies which contain natural fluorides, ranging from 0.7 ppm to 3.0 ppm, or more. One community, Stevens Point, Wisc., is reported to have abandoned fluoridation after having started it.

High Rate Filters and Recirculation

(Continued from page 87)
media. For those who prefer to use acre-feet, such loadings may be obtained by multiplying cu. yd. loadings by 1.613.

The quality of the effluent deemed necessary must be weighed against the cost of larger filters or larger settling tanks, or both, and against the provision of an effluent filter of a mechanical type. At present labor costs, conventional open sand beds

are quite costly to operate and will rarely be desirable.

The above costs and the quality of the effluent deemed necessary should also be weighed against the cost of a two-stage filter. If an effluent is required having a BOD of less than 40 ppm, consideration should be given to a two-stage installation.

Two-Stage Filters

Though exactly the same amount of filter media is used as in single stage filters, better results in terms of BOD reduction are always obtained with a two-stage plant. The added cost of a two-stage filter is represented by the extra cost of two smaller distributors as compared to one larger one, and the additional retaining wall required. For instance, with a loading of 1.50 pounds per cu. yd. there will be required for a single stage filter one 90-ft. distributor and about 286 ft. of filter retaining wall. For the two-stage filter, there will be required two 64-ft. distributors, about 408 ft. of filter retaining wall, and extra accessories. The filter area and filter volume remain the same.

Though there is a theoretical basis for making the secondary filter slightly larger than the primary, in practice both are usually made of the same size, each with one-half the volume of media used in the one single stage filter.

Using the same basis of design as outlined previously for single stage filters, the total volume of stone required for a loading of 1.75 pounds per cu. yd. is 800 cu. yds. This provides two filters of 400 cu. yds. each, equivalent to 0.25 acre-foot each. Using 1:1 recirculation, with the entire primary tank effluent applied to the primary filter, the organic loading will be $1,400 \div (0.25 \times 1.65) = 3,400$ and the efficiency of the first stage of the filter will be:

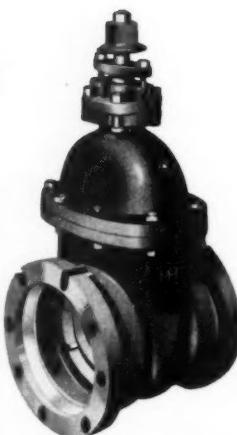
$$\frac{100}{1 + .0085 \sqrt{3400}} = 67\%$$

and the BOD remaining, which must be applied to the second stage filter is $1,400 \times 0.33$ or 462 pounds. It is not necessary to compute, at this time, the BOD of the effluent.

In the loading formula for the second stage of filtration, consideration must be given to the treatability of the first-stage effluent. The more easily oxidizable materials are removed in the first stage filter. Thus,

M & H Mechanical Joint ends on gate valves are identical with mechanical joint standards adopted by the Cast Iron Pipe Research Association. It uses the stuffing box principle, by which a thick gasket is compressed into a stuffing box by a bolted gland or follower ring. It is a flexible, bottle tight joint, easy to make, and economical. Mechanical joint making in the field does not require a skilled workman. Mechanical joint permits deflection in any direction, also longitudinal expansion and contraction.

For complete information, write or wire M & H Valve and Fittings Company, Anniston, Alabama.



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Worthy of national recognition is the achievement of the Federation of Sewage and Industrial Wastes Associations.

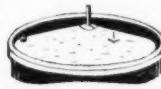
With singleness of purpose this organization has gone quietly about its business of lastingly safeguarding America's health and well-being through safe sanitation.



P.F.T. SEWAGE SIPHONS



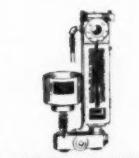
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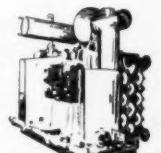
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the loading for the second stage filter is multiplied by the factor $1/(E^1)^2$, where E^1 is the efficiency of the first stage. The organic loading L_2 for the second stage filter cited above is, therefore:

$$L_2 = \frac{462}{0.25 \times 1.65} \times \frac{1}{(0.33)^2}$$

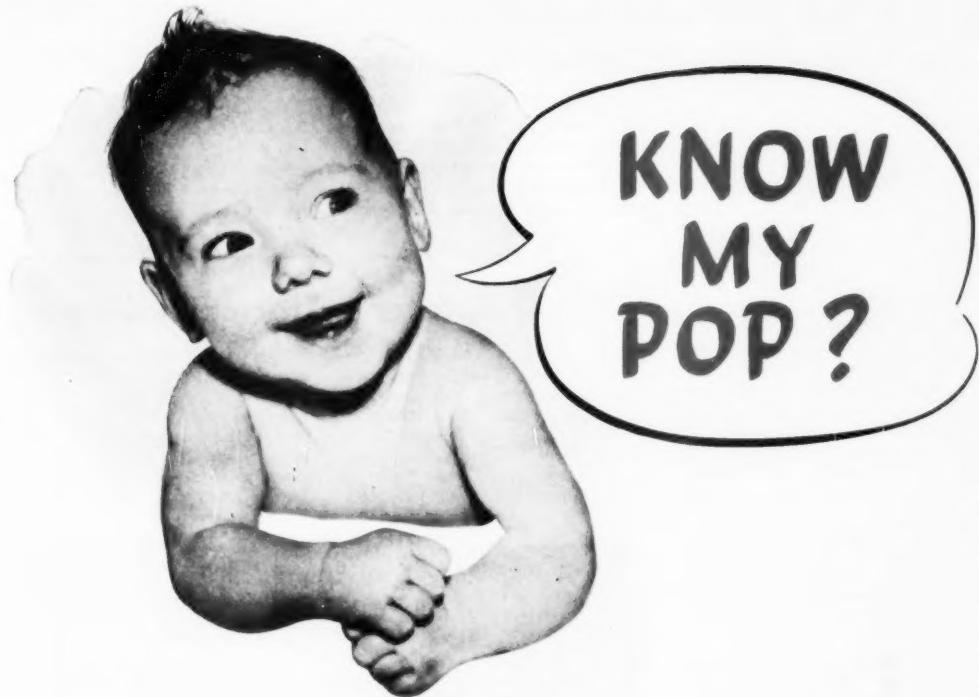
or 10,300 lbs. This value of the organic loading, 10,300 lbs of BOD, is substituted in the filter efficiency formula and the efficiency of the second-stage filter is found to be 53.7%. The BOD in the effluent is then $462 \times (1.00 - .537)$ or 214 pounds, representing an effluent strength in BOD of about 25.7 ppm.

With a loading of 1.5 pounds of BOD per cu. yd., the volume of media will be 930 cu. yds., or 0.577 acre-foot, and the volume of each filter will be 0.289 acre-foot. First-stage reduction will be 68.5% and second stage reduction 55%. Final effluent will be about 24 ppm BOD. With a loading of 1 pound of BOD per cu. yd., or 1,613 pounds per acre-foot, the final effluent will be slightly under 20 ppm BOD.

If recirculation is reduced from 1 to 1 to 0.5 to 1, with a loading of 1.75 pounds per cu. yd., the probable effluent will contain 28.5 ppm BOD. With a loading of 1.5 pounds, and a recirculation ratio of 0.5 to 1, the final effluent will be about 26.5 ppm; and with a 1-pound loading, it will be about 21.5 ppm. These data are summarized in the diagram.

The computations show the marked improvement in effluent resulting from use of the 2-stage process. It will usually cost less to employ a moderate loading and a low recirculation ratio; and a very good effluent will result. The only added cost in operation is the very small item of secondary recirculation.

There is relatively slight virtue, with normal strength sewage in using a high recirculation ratio. With raw sewage having a BOD of 240 ppm, and a loading of 1.50 pounds of BOD per cu. yd., a 2:1 recirculation ratio will, with a single stage filter produce an effluent of 37.7 ppm as compared to 41.7 ppm, with a 1:1 ratio. With 2:1 recirculation ratio, a 2-stage filter effluent will contain about 21.1 ppm BOD as compared to 24 ppm with a 1:1 ratio. Thus, the extra costs associated with high recirculation ratios are not often justified. The use of a 2-stage filter or a reduction in loading will generally be more economical.



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Siltation of Lake Springfield and Recommended Control Measures

LAKE Springfield, the municipal water supply reservoir at Springfield, Illinois was completed in 1934 at a cost of about \$2,500,000. The lake has a surface area of 4234 acres. A sedimentation survey of this reservoir in 1948 showed that in its life of 14.6 years, the original storage capacity has been reduced from 20.0 billion gallons to 19.1 billion gallons. This amounts to 4.36 percent total loss or 0.30 percent loss per year. At the present rate of sedimentation the ultimate life of the reservoir will be approximately 300 years.

The sediment accumulation in the reservoir represents an average rate of sediment production from the watershed amounting to 48.0 cubic feet or 1.03 tons per acre per year. The 870,000 gallons of storage space lost to sediment every year in Lake Springfield, would cost \$17,018 to replace at 1952 price levels.

These are among the conclusions drawn from a study of the lake by the Illinois State Water Survey, and reported by J. B. Stall of the Water Survey, L. C. Gottschalk of the U. S. Soil Conservation Service and H. M. Smith of the Illinois Soil Conservation Service. Other conclusions and findings were:

The total gross erosion on the watershed is estimated at 600,000 tons per year. Nearly $\frac{3}{4}$ of this is deposited throughout the stream system. The remaining $\frac{1}{4}$, primarily the finer-sized fractions, is carried into Lake Springfield.

A complete watershed treatment program including conversion in land use, proper rotations and contour farming would reduce sheet erosion and reservoir sedimentation by an estimated 78 percent.

Lake Springfield has a total drainage basin of 265 square miles. Dark-colored soils, nearly level to gently sloping, and having a high capillarity, extend over 76.8 percent of the drainage area. Light-colored, gently sloping to steep soils cover 19.7 percent of the drainage area.

Erosion is progressing rapidly in many parts of the watershed due primarily to the high percentage of land which is plowed each year for crops. About 85 percent of the total watershed area is used for crop land, including 55% for row crops.

The adoption of recommended soil conservation practices in the watershed treatment program means increased net income to the farmer. Illinois studies in areas comparable

to the Lake Springfield watershed show that the costs of applying such conservation measures were repaid within ten years by increased income.

Physical factors have no regard for civil boundaries or fence lines and a drainage area plan would be necessary for most effective and efficient control of erosion on a watershed basis.

Stump Splitter is Tractor Mounted

FACED with a job of clearing stumps ranging up to eight feet in diameter from a new highway right-of-way on the Olympic Peninsula, Thomas Scalzo Company, Seattle, Washington, contractors, designed and built a "stump splitter" of armor plate steel which was fitted to a Bucyrus-Erie

The tractor then uses the sword-like pointed bar as a wedge and by pushing the halves of the stump from one side to the other, the unit uproots the entire stump in a matter of minutes. The uprooted stumps are then pushed into piles and burned. According to the owners, the largest stumps require several



bulldozer blade mounted on an International TD-24 crawler tractor.

This unique piece of equipment was constructed from a 4" by 6" bar of armor plate steel, 48 inches long. The "business end" was sharpened to a point and the other end was welded to a $\frac{1}{2}$ -inch steel plate which was shaped to fit the curve of the bulldozer blade. This plate was fastened to the dozer blade by eight half-inch bolts placed along the cutting edge of the blade with a $\frac{1}{2}$ -inch bolt at the top of the plate to steady the rig. A one-inch gusset was added to each side of the "Stump Splitter" bar to provide lateral stability.

In operation, the stump splitter is driven into the stump by the tractor, splitting the stump in half.

passes with the tractor but the stumps are always removed and in the fire in less than twenty minutes time.

Scalzo's initial use of the TD-24 and stump splitter was on the company's contract to clear 4.75 miles of right-of-way for a by-pass which will carry State Highway 21A around the town of Poulsbo on the Olympic Peninsula, Washington. The route is in low, swampy terrain with little rock and only a few boulders which require blasting. However, the entire route is studded with large stumps and the Scalzo company estimates that the TD-24 and the splitter saved at least 5,000 pounds of blasting powder as well as the time and labor involved in preparing the stumps for blasting.



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MILWAUKEE CONSIDERS COMPOSTING GARBAGE

John Hubel

FOR some time the city of Milwaukee, Wisc., has been considering composting its garbage. So far as can be learned, Oakland, Calif., is the only city now using this method. Miami, Fla., a few years ago attempted to install a Verdier system of composting; and Scarsdale, N. Y., installed a Beccari system about 20 years ago. It is reported that operation was halted after several years because of nuisance factors which could not be controlled.

In 1950, Milwaukee contacted the Frazer Corp. for information regarding a composting plant in use at the Chicago Stock Yards. A representative of that company attended a meeting in the office of Mayor Zeidler of Milwaukee, but no actual proposal was submitted to the city. The meeting was attended by city and sewerage commission officials and scientists from the University of Wisconsin.

Since then, Mayor Zeidler has personally requested further investigation of this subject. Correspondence has been carried on for the city by W. C. Webb, assistant superintendent of the Milwaukee Public Works Department. He has written to a number of communities and to the University of California, which has just completed a 2-year research problem on this subject and on incineration. Recently, the American Composter Co. of Lansing, Mich., has been contacted by the city, as that company claims it is ready to build composting plants to meet municipal garbage disposal needs. However, no experience factor appears to be available from this source.

Estimated Cost Data

Mr. Webb has written to Dr. Pfeiffer and the Compost Corp. of America for information. The reply from Dr. Pfeiffer stated that he believes that composting could be accomplished successfully on an outdoor basis, similar to the method used in Oakland. In Milwaukee's climate, this could best be done, from an economic standpoint, on an outdoor piling basis, which would require from 10 to 20 acres for stockpiling purposes. Dr. Pfeiffer

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further states, according to Mr. Webb, that an outdoor type of plant would cost about \$250,000 per 100 tons of capacity per 24 hours. At the Oakland installation, it is reported that the cost of producing compost ready for commercial sale is about \$35 per ton. Dr. Pfeiffer further stated that their engineers will be ready to furnish definite figures in the near future.

Finances of Method

In Mr. Webb's opinion, although possibilities for composting garbage are bright, there does not appear to be sufficient evidence at this time, based on experience, to warrant Milwaukee taking on such a project at the present; nor does it appear feasible economically. According to the Bulletin of the University of California "a figure of \$15 per ton of dried humus (derived from 20 cu. yds. of organic refuse) represents a reasonable price which communities could count on as steady income from humus sales." The \$40 per ton obtained from Milwaukee's Milorganite is dependent on an expensive sales promotional organization and a "suburban" market. Commercial farmers cannot pay this price for fertilizer. In Mr. Webb's opinion, therefore, the \$34 or \$35 per ton cost of production at Oakland does not indicate economic feasibility.

Objections to Composting Garbage

Further, there is the difficulty in obtaining adequate incinerator sites where Milwaukee would construct architecturally attractive buildings, well landscaped, and enclosing entirely all disposal functions. Mr. Webb feels that it would be most difficult to obtain a site within reasonable hauling distance where the city could stockpile up to 30 days accumulation of garbage out in the open, which would require about 15 acres. It will still have to be shown that this can be done without creating a nuisance. It is felt that the appearance of such a pile of refuse, even if the odor and vermin nuisance were eliminated, would be bad enough, considering that people object even to having a concentration of garbage trucks in their neighborhood.

In spite of these objections that appear to exist to a composting plant, further investigations of the subject will be made by Milwaukee.



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Oregon Trail

(Continued from page 83)

But this soil is peculiar. It seems to remain an aggregation of minute particles of basaltic rock. It never becomes an intimate mixture of completely disintegrated stuff that sticks together. This explains the need in this section for almost constant sprinkling to make anything grow. The water isn't held in the top layer of "soil", as in clay soils, but goes straight down.

As this soil gets dry it becomes loose. Whatever binding effect it has from water content is lost when the water drains through or evaporates out. Dry slopes slide. Detours go out of place without warning. So contractors found that they did better by bringing traffic through the new work, rather than take chances on hastily prepared detours. When the rains began the soil firmed up again, and the danger of slides diminished.

Earth Excavation

Vernie Jarl, of Gresham, Oregon, has some heavy excavation in a side-hill lie that won't behave in dry weather, and that turns into muck in the rain. He has 3.7 miles lying parallel to the old route about 30 to 40 ft. lower than that route, and the old grade is carrying normal traffic while he digs away on his contract. The section is so close to the Union Pacific main line that he has to be cautious with explosives. Slides might cover the tracks.

He must take out 720,000 cu. yds., with a very long haul. About 2,320,000 yards must be hauled 600 to 1200 ft., and more than 53,000 yards must be toted more than 1200 ft. The material is a mixture of rock and earth. Some of this is loaded by shovel into trucks and LeTourneau Turnrockers. When more effective, Caterpillar DW-10 wagons are used.

A Chicago Pneumatic compressor mounted on a truck is kept handy for any minor shooting necessary, but very little shooting was done in starting the job. For heavy shooting of outcrops a 500-ft. portable Worthington compressor is brought into use. Two Lorain crawler shovels are used in the main excavation, loading into Diamond and International trucks of 6 and 8-yard capacity.

Rogers Construction Company and Babler Bros. of Portland had some tough going, typical of the

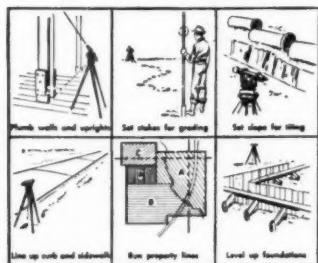
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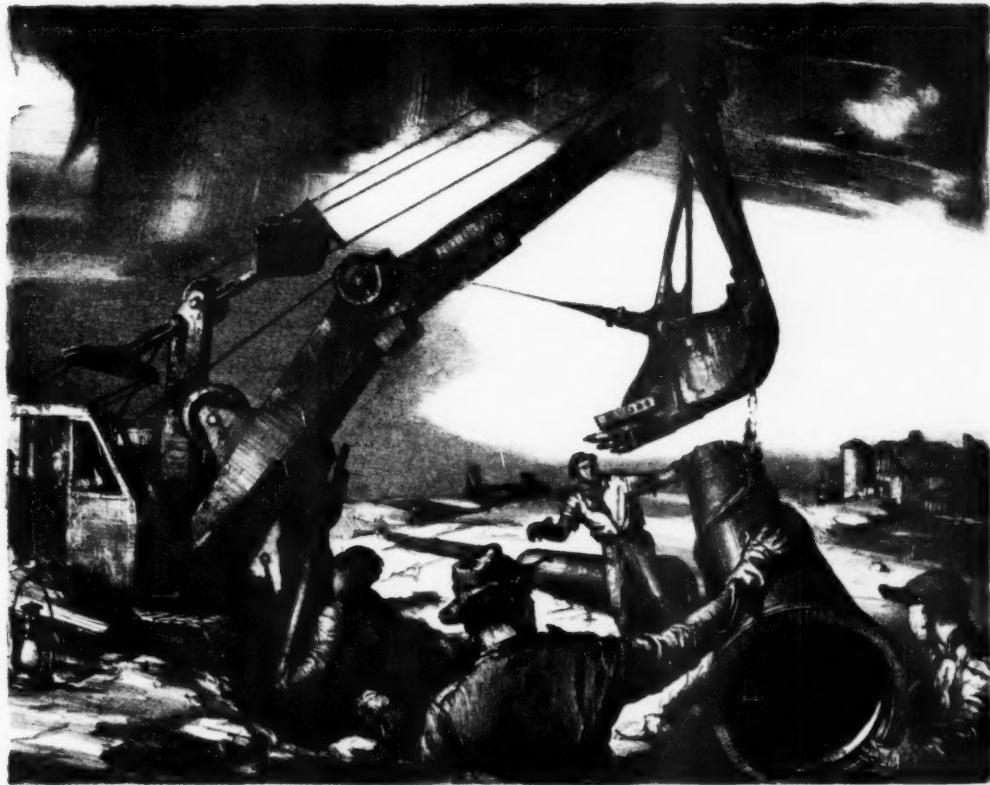
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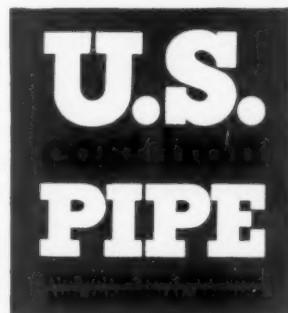
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"breaks" in this project. They have completed their stint of 300,000 yards of grading, but they lost their detour in slides, and have had to fight sliding back slopes that almost covered parts of the top course of bituminous paving already in place.

They ran into one "normal" difficulty with springs, in dry weather, and had to tap the slope with piping to carry off the troublesome ground water.

This company tried the new 18-yd. Euclid scrapers on their job. They are new in the Northwest, at least. Glen Stevenson, manager of the project, used four of them for shovel material containing heavy boulders. They did surprisingly well in spreading the finer rock top course, working at high speeds. They loaded up in 90 seconds with one tractor, and even faster with two. The record was made by a Caterpillar, 9-yd., with a scraper, loading in 30 seconds.

A different kind of job is being undertaken by Gibbons and Reed, of Salt Lake City, on six miles of the new route. This is moving 2,000,000 yards of talus rock lying on a 1½ to 1 slope, at 29¢ a yard. This detritus lies under a basaltic rock bluff 800 ft. high for about half a mile along the highway. Cutting into such a mass of unbound fragments is considered very hazardous. Once disturbed, no one can tell how far the accelerating movement may extend. And there is no way to slow it down when it starts. But this concern has had experience on another job of the same kind.

Laying Hot Surfacing

Another interesting practice has been developed in laying hot asphalt on the top course of rock. Rain is a seldom absent factor in any contractor's calculations in this Northwest country. No one feels happy unless it rains. They call it "dry rain," because everyone becomes so accustomed to it, but it isn't dry in the time-saving plans of a hot-asphalt paving contractor.

Warren Northwest Inc. laid hot mix in driving rain. They tried it to get the job done last year. Now they wonder why they ever need stop because of rain. The State Highway Department was properly skeptical, but tests showed a successful bond between top course and the asphalt, with no bad effect upon the finish.

Clay Cornett, resident engineer

for the Highway Commission, was won over completely to the procedure. Lester Clinefelter, inspector for Warren Northwest, agreed. But they recognize certain minimum requirements. The roadbed must be prepared carefully, with a slight crown to throw the water off. The top course must be shot with plenty of binder just before the hot asphalt is spread. No traffic can be permitted on the surface to disturb this careful preparation. There must be no dished spots to hold water.

The experiment was successful here because all these conditions were carefully complied with. The roadbed was topped with $\frac{3}{4}$ -inch minus rock mixed with plenty of binder. It was given a $1\frac{1}{2}$ -inch crown. The water went off so quickly that the surface scarcely looked wet when the hot mix was spread.

A hot-mix plant was set up at a stockpile near one end of the 6.5-mile section. It was capable of turning out 100 tons per hour, with only one drier. Due to the rains the plant could not dry the rock fast enough to develop the plant's full capacity, but this difficulty was reduced by doing some mixing as the material was pushed into the feeder.

As the asphalt left the plant it was at 300° temperature, and it was carried the seven miles in four-ton dump trucks in heavy traffic. At the job it was delivered to a Barber-Greene finisher at about 275° . No blankets were used to hold the heat in transit.

The Barber-Greene finisher, 10 ft. wide, had an extension built out one foot on each side to cover the 12 ft. lane. A laborer worked on each side, filling in the shoulders with a hand shovel. Additional material was thrown into uneven places and immediately rolled down. A tamping foot on the finisher made it unnecessary to use a three-wheeled roller right behind the spreading, but a 10-ton Buffalo-Springfield roller made one trip as soon as the mix was in place, and another after some cooling. Even with the air temperature as low as 40° , with showers coming with normal unpredictability, the second pass was often made within an hour.

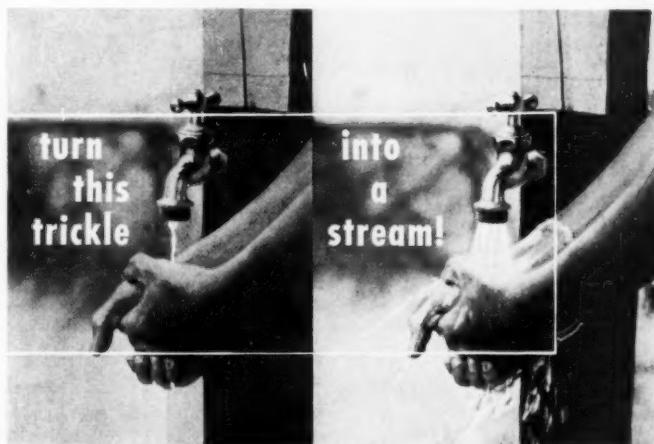
When six to eight trucks were hauling as far as the end of the section a good laydown was 450 tons in an 8-hour shift, or about 14.58 tons per station in a 12-ft. lane, finishing 3,000 lineal feet per shift. Specifications called for 5%

to 7% of asphalt by weight. The most workable admixture to this lava, or basaltic rock, was found to be 6.3%.

The new route is only 9.5 miles shorter than the old one—66.6 miles compared to 76.1. But in the new alignment over $1\frac{1}{4}$ miles of rise and fall were saved, and more than 58 complete circles in curvature. This is an eloquent epitome of the practical worth of proficient engineer planning.

Personnel on the current contracts are: For the State Highway Department, Clay Cornett and Carl

Peterson, resident engineers. For Rogers Construction Company and Babler Bros., Glen Stevenson, project manager; Jay Perdue, superintendent; Wayne Weeks, shovel foreman; George Scott, grading foreman; and Allan Bem, master mechanic. For Warren Northwest, Inc., R. A. Jenkins, general superintendent; L. E. Rader, hot plant foreman; H. D. Bartholomew, laydown and finishing foreman; and Ed Bush, crushing plant foreman. For Vernie Jarl, Arthur Bolder, superintendent; and Ralph Steele, foreman of the clearing crew.



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**PUBLIC
WORKS**

**ENGINEERING
DATA**

Beneficial Effect of Enzymatic on Glass Model Septic Tank Operation

A SERIES of experiments was conducted during the period Oct. 1, 1951 to June 20, 1952, by the N. O. Nelson Co., to determine the effects of Enzymatic in reducing solids and BOD of sewage. The objectives of the test were to make daily observations on activity taking place in septic tanks and to follow, by specific analytical procedures, changes taking place in the sewage passing through the tanks as reflected by the supernatant liquor and by the effluent; and, further, to furnish practical first-hand information relative to tanks operating normally and also on those that have had operation upset by detergents, such as are found in normal household sewage today. The data obtained will furnish information for correct dosage in treatment of home septic tanks.

Physical Facilities and Operation

Six scale model glass covered glass septic tanks, 20½ inches long by 11½ inches wide and 16 inches deep; influent and effluent openings so placed as to allow for 12 gallon sewage capacity in each were used. The temperature for the septic tanks was maintained at 65 degrees F. with electrostatically controlled water baths, each bath being also equipped with small water circulating pump.

Each tank was flushed four times daily, using two quarts of raw sewage per tank for each flushing. Initially the tanks were filled with raw sewage and allowed to stand for fifteen days to permit a start of digestion. The tanks were flushed at 8:00 A.M., 10:00 A.M., 2:00 P.M. and 5:00 P.M. This dosage gave approximate proportional dosing of that of a 500-gallon tank receiving 80 gallons of home sewage daily.

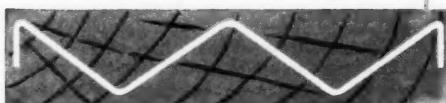
The raw sewage was obtained daily from a 512-unit housing project, from the influent line of the sewage treatment plant. Twelve gallons were collected daily at 8:30 A.M. and thoroughly agitated before the tanks were flushed.

At the start of this series of experiments, all six tanks were charged with twelve gallons of fresh raw sewage. Tanks 1 and 2 received no Enzymatic treatment; Tanks 3, 4, and 5 received 12 grains of Regular Enzymatic; and Tank 6 was dosed with 24 grains of Regular Enzymatic.

Tanks 3, 4, and 5 were then treated every 7 days with 12 grains of Regular Enzymatic until a total of 48 grains had been added to each tank after which time 12 grains were added every 30 days. Tank 6 was dosed every 7 days until a total of 96 grains had



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been added to the tank and then it was dosed with 24 grains every 30 days.

Tanks 1 and 2 developed a scum layer about 1½ inches thick by the 14th day whereas the treated tanks developed what appeared to be only an oily film. Throughout the tests the untreated tanks contained a very fluffy sludge that did not settle well in the tank whereas the treated tanks contained what appeared to be a much heavier sludge. The sludge in the untreated tanks ultimately began to discharge into the effluent.

Average BOD of the raw sewage was 272 ppm. Average BOD of the effluents from the various tanks was as follows: From Tanks 1 and 2, the control tanks, BOD was 147 and 149 ppm respectively, indicating a reduction of 45.9% and 40.2%. From tanks 3, 4 and 5, which were treated as indicated previously, BOD was 118, 121 and 117 ppm, respectively, indicating BOD reductions of somewhat better than 56%. In Tank 6, BOD reduction was 60.2%. In the treated tanks, pH was higher, but in none of them did it exceed 6.8. Suspended solids were also reduced by Enzymatic treatment. In the untreated tanks, average removal was a little better than 58%; in the treated tanks, it ranged from 79.8% to 85.2%. Suspended solids in the raw sewage averaged 223 ppm.

Costs of Laying 6-inch Pipe in Toledo

Costs for laying 14,819 ft. of 6-inch water lines in Toledo, Ohio, in 1950 and 1951, averaged \$4.91 per ft. These costs were divided as follows: For materials \$2.60 per ft.; for labor \$1.12 per ft.; for equipment 62 cents per ft.; for supervision and overhead 37 cents per ft.; and for engineering 20 cents per ft. A breakdown of the costs for lines of various lengths installed during the two years shows that for lines of 500 ft. or less, the average cost per foot was \$6.57; for lines 500 to 1,000 ft. long, the cost was \$5.17 per ft.; and for lines over 1,000 ft. long, the average was \$4.07 per foot. Overall, the material costs averaged 53 per cent of the total, and labor was 47 per cent. These data are from the excellent report for 1951. George J. Van Dorp is Water Commissioner.

Calcium Chloride in Road Construction

A Committee of the Highway Research Board is conducting field and laboratory studies on the results in soil stabilization of the addition of calcium chloride to soils of various types and conditions. Their latest progress report states that tests indicate that a substantial saving in compactive effort required to obtain a specified density is effected by the addition of calcium chloride. Increasing values of maximum dry density were obtained with each addition of calcium chloride. Apparently calcium chloride lowered both the liquid and plastic limits of some of the soils tested, and retarded the drying out of the soils when subjected to accelerated drying.

Largest Turbine Pump Installation

The Park Water Station of Spokane, Wash., is said to contain the largest municipal turbine pump installation under one roof in the United States. There are eight 28-in. Fairbanks-Morse turbines, one driven by a 900-hp motor, the other seven by 600 hp motors. The combined capacity is 100,368,000 gpd.

**PUBLIC
WORKS**

DIGESTS

THIS section digests and briefs the important articles appearing in the periodicals that reached this office prior to the 15th of the previous month. Appended are bibliographies of all principal articles in these publications.

SEWERAGE AND REFUSE . . . 115

HIGHWAYS AND AIRPORTS . . . 123

WATER WORKS . . . 129

THE SEWERAGE AND REFUSE DIGEST

Prefabricated Trench Sheeting

In laying over two miles of 102 in. sewer pipe at depths to 24 ft. at Middletown, Ohio, the contractor used a prefabricated section of steel sheeting 20 ft. long. After the trench had been started, the sheathing unit was placed in position and the trench excavated by clamshell, the sheeting settling down in the trench in a manner similar to the settlement of a bridge-pier caisson. After the pipe had been laid, the entire section of sheeting was lifted out by a crane and moved ahead 20 ft.

"Steel Trench Sheeting Nets Dollar Savings Plus Safety;" *Engineering News-Record*, August 14.

Composting Organic Refuse

Scientific principles and practical considerations involved in the composting of garbage are being studied at the Sanitary Engineering Research Laboratory of the Univ. of California, in cooperation with the State Health Dept. One item of information obtained was that flies have no interest in compost material itself, but rather in the surroundings where these are not kept clean. Studies were made with chopped garbage to which 20% of paper was added, resulting in a carbon-nitrogen ratio of 55:1. The compost was turned daily—when turned only every third day, anaerobic conditions developed in the middle of the pile. It was indicated that a moisture content of 76% is the maximum allowable for maintaining aerobic conditions: the maximum carbon ratio permitting composting is above

55:1; actinomycetes found in cellulose decomposition thrive in a relatively well aerated material; daily turning is necessary only in materials with moisture percentage in the upper seventies. This information was used in composting city garbage at Berkeley and excellent composts obtained within two to three weeks.

"Studies in Composting Organic Refuse;" *PUBLIC WORKS*, September.

Two-Stage Chlorination

Two-stage chlorination as practiced at two primary treatment plants in Michigan consisted of adding chlorine to the raw sewage ahead of a grit chamber at a rate sufficient to produce a residual of some magnitude, if possible, but less than 0.5 ppm, and the simultaneous addition of chlorine to the settling tank effluent to produce a residual of about 0.5 ppm after a minimum contact period of 5 min. for every particle. Studies of the method by the Michigan Dept. of Health led to the following conclusions: The process of two-stage chlorination is much more dependable than either pre-chlorination or post-chlorination alone, in the consistent production of coliform density of any relatively low magnitude. Its greatest advantage is the relative ease with which enduring chlorine residuals can be maintained in the effluent. Coliform densities of 500 MPN per 100 ml can be produced consistently about 80% of the time with contact periods for post-chlorination of about 5 min., or 98% of the time

with 12 min. post-chlorination. A standard of 100 MPN can be met at least 90% of the time and 36 at least 80%. Control of chlorine dosage to produce consistently a residual in the final effluent was accomplished with ordinary effort. Control was exercised by adjustments in dosage rates based on predicted hourly trends in both sewage flow and its chlorine demand and on observation of chlorine residuals at $\frac{1}{2}$ -hr. to 1-hr. intervals. At one plant the chlorine dosage required during the 8 A.M. to 4 P.M. period generally varied from 8 to 14 ppm; and was about 5 ppm at night. Generally 2 to 3 ppm of chlorine were required for post chlorination.

Donald M. Pierce—"Two-Stage Chlorination — An Effective and Practical Method of Sewage Disinfection;" *Sewage and Industrial Wastes*, August.

Composition of Aeration Tank Froth

Froth is mostly air, containing some liquid, which contains a small amount of solids, a considerable part of which is grease. The author condensed 9 cu. ft. of fresh froth from an aeration tank into a quart of liquid for analysis. This liquid contained, by weight, 0.77% total solids, 0.18% grease, and 0.09% alcohol-soluble detergent. The remaining total solids were sewage solids. Froth from the final effluent of activated sludge plants contained about twice as much grease. Economical control of frothing is obtained by a combination of spraying and applying an anti-foam

chemical, but not by either alone. Wellington Donaldson—"Composition of Aeration Tank Froth;"—*Sewage and Industrial Wastes*, August.

Comparison of Refuse Disposal Methods

Madison, Wis finds it necessary to abandon its present method of disposing of its garbage on a hog farm, and Greeley & Hansen made a thorough study of the entire refuse disposal problem. They considered five methods: Incineration by one

incinerator; by 2 incinerators; land fill; garbage grinding to the sewers; garbage grinding directly to the sewage treatment plant. They consider land fill one of the most economical means of disposing of mixed refuse. Incinerators can be operated without nuisance, producing ashes amounting to 10% to 20% by weight of the refuse. Grinding garbage does not eliminate the problem of ashes and rubbish, which constitute about 90% by volume of the total refuse production. Composting is rejected on the grounds of uncertain and

apparently high first and operating costs, increased collection costs because of separation required, and absence of operating data under U. S. conditions. Grinding of garbage was eliminated from consideration on the grounds that the method is less secure than better established methods, and adverse effect on sewage plant effluent is feared. The land fill method can be put into effect quickly and at low first cost, but any long-range program should be based on the eventual construction of an incineration plant. The land fill project has a lower annual cost than incineration when the average haul to the land fill site is less than 7.5 miles. Calculations were based on a design population of 125,000. The annual costs were estimated to be as follows: Incineration, one plant \$454,556; two plants, \$486,760. Land fill, \$379,972 to \$616,259. Garbage grinding to sewers, \$495,922; at treatment plant, \$450,821.

"How to Compare Refuse Disposal Costs;" *Engineering News-Record*, Sept. 4.

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Analysis of Refuse Collection Costs

Field investigations of municipal refuse collection were conducted by the authors in 13 California cities. More than 200 refuse collection trips were accompanied and timed. All of the cities employ some form of land disposal and collection averages approximately 84% of the total cost of their refuse activities. Most employ combined collection of garbage and residential refuse. The collection operation was divided into four operations—pickup time, consumed during actual collection: haul, time for round trip to disposal site, off-route, time taken out for rest periods, smoking, personal reasons, and other miscellaneous activities; and at site—unloading and waiting to unload. The average pickup time was 148 man-minutes per ton for combined collection, and 136 for commercial refuse. This averaged 70% of the total trip time. Where containers were placed at the alley or curb the pickup time averaged 103 man-minutes per ton; where all containers were at the rear of the house, the average was 165 man-minutes. With wages at \$1.50 per ton, picking up at the curb cost \$2.56 per ton; rear-of-house pickup, \$4.15. The data indicate that pickup densities between 30 and 180 services per mile have

relatively little effect on the labor requirements; but at densities of less than 30 services per mile the labor requirement increases markedly. The mechanical compaction type of vehicle delivered refuse averaging 440 lb. per cu. yd.; the open-body trucks, 323 lb., giving a compaction ratio of 1.36:1.0. The per-ton labor requirements of the two types of vehicles differed only slightly. The maximum average haul speed varied from 27 mph for long hauls to 15 mph for short hauls.

From the data collected, the authors developed formulas and nomographic charts for purposes of analysis and design, such as determining the most economical combination of size of collection vehicle, number of trips per day, and number of men per truck; or how far can be the haul to a land-disposal site to keep the cost below that of incineration.

Erman A. Pearson, Broderick P. Haskell and Norman P. Jones—"Municipal Refuse Collection Practice Analyzed;"—*Civil Engineering*, September.

Disinfecting Small Tanks

Recent experiences have developed a method of disinfecting water tanks by spraying with chlorinated water. A solution of calcium hypochlorite such as "HTH" or "Perchloron" containing about 500 ppm of available chlorine is placed in the bottom of the tank to about 1 ft. depth. This is sprayed over the sides and roof of the tank intermittently over a 2-hr. period, using a hand pump or a small leak pump. (The authors used a civilian defense stirrup pump.) Thus the bottom of the tank, the location of the maximum contamination, is continuously covered by the sterilizing solution and the sides and top will have periods of contact with the hypochlorite solution which have been found to be sufficient for disinfection in all cases encountered. For larger tanks, a drum placed under the tank drain was used as a suction reservoir for a leak pump. The operator should wear a gas mask and rubber boots, rain coat and hat.

There is relatively little economic advantage in using this method for tanks of less than 25,000-gal. capacity rather than filling the entire tank with a 50 ppm chlorine solution, but little water has to be dumped, the tank can be placed in service in a minimum of time, and all of the inside will be covered by

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Harry W. Tracy and Edw. L. Fonseca—"Spraying Methods for Disinfection of Small Tanks," *Water & Sewage Works*, August.

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A New Look in Incinerators, Aug. 21, Pp. 44-45.
How to Compare Refuse Disposal Costs, Sept. 4, Pp. 152-159.

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Industrial Wastes in the Metropolitan New York Area, September, Pp. 50.
A Small City Can Afford Modern Sewage Treatment, By C. N. Harrub, Cons. Engr., September, Pp. 59.
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Sanitary Engineering Research Project of the University of California, By P. H. McGaughy, Ass't Director of Project, August, Pp. 310-313.

Modern Sewage Treatment For Grinnell, Iowa, By H. S. Smith, Cons. Engr., August, Pp. 316-321.

British Views on the ROD Test and Double Filtration, By John Finch, Mgr. Sew. Disp. Dept., Rotherham, England, August, Pp. 312-314.

Pollution Problems of Industry—Realism vs. Dogma, By L. L. Hedgepath, Am. Cyanamid Co., September, Pp. 365-367.

History-Making Lawrence Experiment Station, By Joseph A. McCarthy, Chf. of Laboratories, Lawrence Exp. Sta., September, Pp. 371-376.

The Parabolic Flume for Sewage and Sludge Measurement, By Frank L. Sommer, Simplex Valve & Meter Co., September, Pp. 377-380.

Sewage and Industrial Wastes

Two-Stage Chlorination—An Effective and Practical Method of Sewage Disinfection, By Donald M. Pierce, San. Engr., Michigan Dept. of Health, August, Pp. 49-50.

An Investigation of the Rotary Vacuum Filter Cycle As Applied to Sewage Studies, By Albert H. Hall, Cons. Engr., August, Pp. 962-984.

Radioactive Waste Disposal to Public Sewers, By F. W. Kitterell, San. Engr., Atomic Energy Com'n., August, Pp. 985-993.

Treatment of Cotton Finishing Wastes at the Savile Finishing Plant, Inc., By George G. Roosen, Cons. Engr., August, Pp. 994-1000.

Waste Loadings From Potato Chip Plants, By Ralph Forges, Sr. San. Engr., U.S.P.H.S., August, Pp. 1001-1004.

Rag, Ropé and Jute Wastes from Specialty Paper Mills: Treatment by Aeration, By William Rudolph and N. L. Nemorov, Rutgers Univ., N.J., Pp. 1005-1014.

Quantitative Estimation of Salmonella in Irrigation Waters, By S. G. Dunlop, R. M. Tweed and Wen-Lan Lin Wang, Assoc. Prof. of Biology and assistants, Univ. of Colorado, August, Pp. 1015-1020.

Pollution Control of the Rio Grande in New Mexico, By Robert P. Lowe, Assoc. San. Engr., New Mexico Dept. of Public Health, August, Pp. 1021-1024.

Advisory Planning Cuts Flood Loss, By Kerwin L. Mick, Chf. Engr., and Benjamin M. Storey, Asst. Engr., Minneapolis-St. Paul San. Dist., August, Pp. 1026-1032.

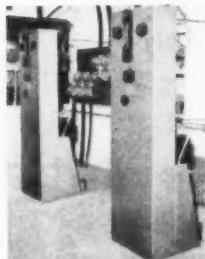
Composition of Aeration Tank Froth, By Wellington Donaldson, Dep. Dir., Div. of Sewage Disposal, New York City, August, Pp. 1033-1035.

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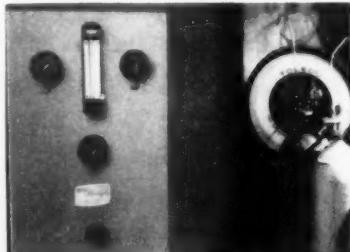
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Harbor Refuse

(Continued from page 81)

ium-rhodium thermocouples are located, one in the combustion chamber and the other in the stack, in 36-inch silicon carbide over silimanite protecting tubes. Special thermocouple lead wires of 16-gauge asbestos over enameled wire insulation connect the thermocouples and the recording instrument, which is located near the main panelboard on the conveyor platform, and registers the heat record during the burning period.

A McNeill smoke indicator was installed which operates an audible alarm system during the period of incinerator operation when smoke

is discharged in violation of air pollution ordinances.

Suitable peepholes are located at convenient spots for observing the process of combustion.

The grate area is constructed of heavy cast iron and the grates are specially designed for this service. The cross-section is capable of resisting the impact to which they will be subjected when logs and heavy timbers weighing as much as 150 pounds each, fall from the height of the apron conveyor. It is planned to have the first few loads of material delivered to the conveyor each day consist of trash and light material so that when charging the incinerator, the grates will be protected to some extent by the cushioning effect of the lighter material which is burned.

The ignition chamber area is approximately 224 sq. ft.; and the combustion chamber volume about 2,400 cu. ft.

The grates are designed for shaking, mechanically, by power operation, to clear them of ashes. The ashes are collected in removable containers located under the grates of the burning chamber in the ash pit, which extends the full length of the furnace. The removable ash containers are moved out of the pit over a track located on the floor of the lower ash pit, and up a ramp to be loaded into a truck and carted away.

A Goulds vertical sump pump, with a capacity of 10 gpm is installed in the ash pit. The weather-proof motor is mounted above the floor.

Gas and Oil Burning Equipment

Gas burners are located in the burning chamber of the incinerator. These have sufficient capacity to ignite the refuse and heavy timbers and heat the chambers up to operating temperature. They are so arranged as to permit of manual shut-off of gas to any chamber. There is also installed a gas-oil vaporizer which can be changed over from gas to oil instantaneously without loss of efficiency. The same burners used for gas are used for oil firing. The gas-to-oil converter is manufactured by Ray Oil Burner Company. A 2,000-gallon oil underground storage tank is located conveniently near the oil and gas burners. The oil pump is made by the Aurora Oil Pump Company of Aurora, Illinois, and is capable of delivering 20 gallons of oil per hour

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to the burners. To insure the safety of personnel against explosion, thermostatic valves will automatically turn off all gas lines in the event of the failure of the gas pressure or closing down or blowing out of the burners. There is also a visual alarm.

The stack is approximately 80 feet in height above the top of the base slab supporting the incinerator. This is constructed of $\frac{3}{8}$ -inch steel plate and lined throughout with refractory tiles and insulating material. A steel ladder with $\frac{3}{4}$ -inch by 14-inch wrought iron rungs, 16 inches on centers, is secured to the stack by $\frac{3}{8}$ -inch rivets through connecting $\frac{3}{8}$ -inch plates. The ladder extends from the top of the combustion chamber to the top of the stack.

A sturdy steel wagon with small single flanged car wheels will be used for hauling the metal box containers filled with ashes from the lower ash pit to the hoist. The wagon is equipped with means for coupling, at either end, to a chain or cable from an automobile truck, by means of which the car and containers will be hauled out of, or lowered into, the ash pit.

The ash containers consist of two

bins 18 inches in height by $5\frac{1}{2}$ feet in length, with width that assures that any ashes dropped through the louvre slats between the upper and lower ash pits will fall inside the bins. The bins are equipped with four steel eyes located on the inside faces of the longer sides to permit of attaching a four-part strutted chain sling for lifting the bin from the wagon by an "A" frame hoist.

One of the $5\frac{1}{2}$ -foot ends of each bin is provided with a hinge at the top and two latches at the bottom to permit the end to open, when unlatched for dumping of ashes.

The incinerator was constructed by the Smith Engineering Company, of Los Angeles, low bidders on the project on a bid of \$79,632. Plans and specifications for the project were drawn by the Port of Los Angeles Chief Engineer, E. S. Earle, and the project was constructed under Mr. Earle's supervision.

Cost of operation will be held at a minimum since the plant operates automatically and requires only one employee for each eight-hour shift. The installation is considered one of the most modern and efficient in existence.

Cyanide Removal

(Continued from page 85)

similar to benzene, which imparts both taste and odor to water. Applying the same principle of additional treatment at the source as in the case of the CN waste, and also using aeration, it was found that both taste and odor could be removed from this effluent.

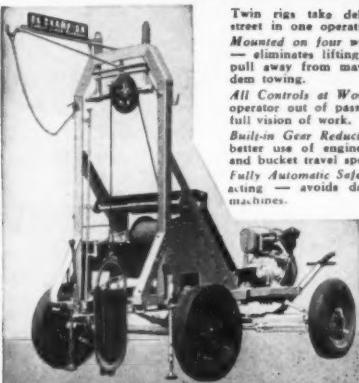
Sewage and Wastes Separated

When preparing plans for the collection system for the plant wastes, it was considered advisable to separate completely the industrial wastes from the sanitary sewage. Although the initial expenditure was higher, the ultimate advantage at some future date was obvious. If it becomes necessary to provide either primary or secondary treatment for sanitary sewage, a separate collection system would have to be installed or all of the combined wastes would have to be treated. In providing, at the outset, for segregation of sanitary and industrial wastes, it was possible to plan the installation for maximum economy and minimum interference

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from other underground installations.

The industrial waste sewers range in size from 8-inch to 36-inch. The sanitary sewers are 8-inch throughout. Final disposal of liquid wastes is through two 24-inch lines extending from the final pumping station, across the top of the levee to a submerged dispersion line 400 feet from the bank.

In addition to these liquid wastes, polymers and tars will be produced in sufficient quantities to justify disposal of these semi-solid materials by incineration. Thus, the completed program provides for total destruction or elimination of all wastes which could in any way pollute the river.

Washington News

(Continued from page 16)

plus an extension across the state to Clearwater, 128 miles long.

HIGHWAY CONSTRUCTION COSTS HIT ALL TIME HIGH

The cost of highway construction rose to a new all-time high for the

second quarter of 1952, according to a report on "Price-Trends for Federal Aid Highway Construction", issued by the Department of Commerce, Bureau of Public Roads, last week. The new index was 171.8 (1925-29 average equals 100) for a 1.6% increase over the first quarter of this year. In terms of 1940 dollars today's highway construction dollar is worth 41.7 cents and indications are that this value will continue to decrease, according to the Bureau of Public Roads. It now takes \$239.80 to do the work of \$100.00 in 1940, the report states.

WATER & SEWAGE CONSTRUCTION

Water and sewage construction approvals totaling one and a third billion dollars, and including projects for military installation and defense-expanded plants, were authorized in the first half of 1952, the National Production Authority, Department of Commerce, said in reporting second quarter actions.

During April, May and June 1952, the Water Resources Division granted construction permits, and allotted controlled materials, for 1032 projects. Water projects were val-

ued at \$271,830,958 and sewage construction at \$282,252,593. These figures include estimated cost of all materials, labor and engineering. Gerald E. Arnold, Director of the Division, explained.

Combined dollar value of first and second quarter, 1952, approved projects amounts to \$1,331,049,910. Third quarter application activity may run at about the same volume as in the second quarter, he said, but probably will be intensified in the last quarter of 1952.

Water Resources Division construction authorization may be for activity in one or more quarter, the division director explained. This division, contrary to practice in NPA's manufacturing divisions, may allot 100% of the materials to cover up to a year of a water or sewage project construction schedule. After that, the applicant presents NPA with a statement of his additional needs, which is considered for further allotment action. This system has proved practical, Mr. Arnold said, because in the course of a year's time difficulties encountered in construction frequently necessitate changes in the applicant's building schedule.

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CUBAN WATER SUPPLY SYSTEM CUTS THROUGH JUNGLE SWAMPS

HAVANA'S fashionable Marianao section, Cuba, recently had its water supply expanded with the addition of a new 42-inch diameter pipeline from wells at Wajay to Marianao, a distance of five miles. The pipeline was laid through uneven ground running through rocky soil, five swamps, jungle and cultivated cane fields. Most of the trench was excavated to a depth of 6½ feet, except for those sections running through the swamps. There it was necessary to dig three feet deeper to allow for construction in the trench bottom of 2½ foot coral rock piers, covered by a 6-inch blanket of earth, on which the pipeline rested.

Wrestling the water supply system through these swamps was only one of the many unusual problems faced on this project by Merritt-Chapman & Scott Corp. of Cuba, and its joint co-contractor, Purdy & Henderson de Cuba, S.A. For example, the 42-inch pipe used had

to be shipped from the American Cast Iron Pipe Company's foundry at Birmingham, Alabama to the Port of Mariel, Cuba, and be transferred to the job by truck. Only one section of 42-inch pipe could be carried per truck, since each one was 16-feet long and weighed better than 3½ tons. This meant some 1,650 truckloads of pipe. A 15-ton capacity crane was used at dockside to swing the pipe aboard truck, but there were few access roads into the swamplands and in these areas the ponderous sections had to be moved for considerable distances by sledge and bulldozer. Smaller sizes of Italit pipe (Italian cement-asbestos pipe) were also used, along with smaller sizes of cast iron pipe, to carry the water to consuming points. The pipe network represented some 40 miles of piping.

At the new Wajay pumping station, 3 additional 30-inch wells were driven to an average depth of some 300 feet (water was reached at 60-

feet). Three 4600-GPM pumps operated by 250-HP motors and two 3300-GPM pumps operated by 200-HP motors were installed at the pumping station.

This project was constructed as one of the improvements planned by the Comision de Fomento Nacional, a department of the Cuba Government set up to engineer and contract various public works projects under special financing. The President of the Comision de Fomento Nacional is Amadea Lopez Castro, and Dr. Carlos Manuel Calvert is General Manager of the Acueductos de Marianao y Regla, which operates the Marianao Water Works.

Ernest Joint is Cuban Manager for Merritt-Chapman & Scott Corp. of Cuba, while Esmond Brownson is President and Jose Sabi is Vice President of Purdy & Henderson de Cuba, S.A. Edward O'Brien is General Superintendent and Jimmie Capalbo is Master Mechanic. The supervising consulting engineers are Frederick Snare Corp. This description is from Black Horse News, house organ of Merritt-Chapman & Scott Corp.



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DIGESTS

THE HIGHWAY AND AIRPORT DIGEST

Pavements at Bus Stops

Hartford, Conn. has recently completed installation of reinforced concrete pavement slabs at eight major intersections where heavy buses stop and where brake and starting action created a sloughing and wavering of the old asphalt. Also the bases broke under the heavy weights, ten times as great as they were designed for. All slabs are made 12 ft. wide and vary in length from 68 ft. to 155 ft. The old pavement is removed about 2 ft. wider to permit matching grades with a bituminous concrete strip. The new slabs are of 10 in. reinforced concrete on 10 in. of processed gravel. Reinforcing consists of $\frac{3}{8}$ -in. deformed bars, spaced 24 in. longitudinally and 5 ft. transversely. Underdrains of 6-in. perforated metal were placed longitudinally under each slab and connected to the sewers.

Frank P. Horan—"What to do About Pavements at Bus Stops;" *PUBLIC WORKS*, August.

Gyroscopic Equipment Used in Highway Surveying

The California Dept. of Public Works in conjunction with the Sperry Gyroscope Co. of San Francisco has developed an instrument and technique for measuring and calculating data concerning alignment and grades on existing roads accurately and rapidly. The equipment used consists of an odometer reading to 0.001 mile, and two gyroscopes, one horizontal, indicating azimuth to the nearest degree; the other vertical, measuring grades and superelevations to the nearest percent. These are mounted in a station wagon, which also contains a generator, converter and voltage regulator. Recordings taken in operating the vehicle are processed mechanically to give azimuth of



Courtesy Roads & Streets

• **LARGER traffic signs are now being used in Pennsylvania.**

At left, comparison of route marker signs; directional signs are 11 by 72 ins.; right, special intersection sign.

curves, central angle, lengths of chords and tangents and grade profiles. Experience in surveying over 3,000 miles indicated that accuracies of 0.2% in distances, and 0.5% in grades can be expected. The field operations can be made at about 5 miles per hour. The cost of both field operation and mechanical processing of the notes is well under \$10 per mile of road traversed.

James T. McWilliam — "Gyroscopic Equipment for Alignment and Grade Surveys;" *California Highways*, August.

Recent Development In Raised Traffic Bars

In 1942, California placed raised traffic bars composed of asphalt concrete 8 in wide by 3 in. high in San Francisco and 6 in wide by 1½ in. high in Daly City. Since then they have experimented with the use of a fibre concrete cast in bars and cemented to the pavement. The latest development is to extrude this material directly onto the pavement by a portable mixer and casting carriage. A cementing agent is applied to the pavement immediately ahead of this carriage, which extrudes the bar directly onto it. The setting time can be varied from 15 min. to 4 hr. The materials used are

white sand, white cement and a patented additive.

The most significant value of this development is in the elimination of inconvenience to the traveling public. A complete raised bar channelization can be installed between the morning and evening traffic peaks during the lighter traffic period of the day, and be turned over to full use within an hour after completion without protective barricades, lights, flares or other barriers.

Blair Geddes — "Recent Raised Traffic Bar Developments;" *California Highways*, August.

Larger Traffic Signs in Pennsylvania

The Pennsylvania Dept. of Highways has decided that extensive analyses of traffic and accident data indicate a definite need for larger signs than those used in the past; also for signs that are reflectorized for night-time visibility. It has started a program of replacing the 800,000 traffic signs on the state highways, to be spread over a period of five years. The new signs follow the AASHO recommendations but the warning signs are made 50% larger. Where special emphasis is needed, they are placed on 60 x 60-in. backgrounds of sheet metal covered with alternate black

and reflectorized yellow stripes. Directional signs are made of 18-gauge metal instead of boards, and are 45, 56 or 72 in. long in place of the old 36 in. standard. All signs, with few exceptions, are reflectorized with a background reflective material, which develops a nighttime appearance very similar to the day-time. Cardinal signs (N, S, E and W) will be placed at intersections, particularly in built-up areas. For mounting route markers, they are trying welded brackets mounted on pipe posts. With interchangeable extension bars, one of these can carry 6 route markers and 12 auxiliary route signs. Supplementing the signs will be reflectorized pavement markings.

H. W. Evans—"Bigger, Clearer Signs;" *Roads and Streets*, August.

Snow Windrows In South Dakota

Snowfall in South Dakota last winter totaled 93 in. at Pierre. The highway commission's equipment for handling this included more than 300 trucks and other units, including 12 rotaries, several wideners with rotary units in the wings and two blower attachments for motor

grader wings. The most noteworthy detail of the state's snow fighting procedures is the use of snow windrows. These consist of combination windrows and trenches plowed progressively in the fields parallel to drift spots along the highways. In many cases they cost less than a snow fence and do a better job. The windrows are enlarged after each snowfall until they may reach a height of 6 or 7 ft. The windrow method is especially valuable along stretches of road in range country, where the wind gets a full sweep.

"Snow Windrows Proved Worth Again in South Dakota;" *Roads and Streets*, August.

Construction of Bases On Minnesota Highways

In reporting on 63 base projects built by the Minnesota Dept. of Hwy Construction in 1951, the Materials & Research Div. said that "the gradation of the base material reflects to a considerable degree the stability potential of the material." Values generally desirable but not often obtainable economically are: 45% passing the No. 10 sieve; 3-6% passing the No. 200 sieve; ratio

200/40, 0.20 to 0.30; slightly plastic to non-plastic; maximum density, over 135 lb. per cu. ft.; optimum moisture, approximately 7% to 8%. Relatively coarse, non-plastic gravel materials require considerable moisture to reduce the high internal friction, which friction also resists deformation under traffic loading. Materials with a relatively high content of plastic fines are easier to consolidate because moist fines decrease the internal friction; for which reason also they facilitate deformation and additional consolidation under traffic loading; when properly densified they are impervious to percolation of moisture and resist wear from traffic, but are subject to deterioration from freezing and thawing if fine-textured.

F. C. Frederickson—"Base Construction Reviewed by Minnesota Materials and Research Division;" *Roads and Streets*, August.

Black-topping Gravel Roads

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1 in. of retread gave as good service as 3 in.; resistance to spring break-ups depended on the base. Where the soil became highly unstable every spring, a 12 in. layer of sand, with good drainage to side ditches was placed the full width of the road. On this was placed 6 in. of gravel in two layers, thoroughly compacted and carefully shaped and black-topped. The finished road is no smoother than the gravel base, which is continuously scraped and graded during the rolling with rubber-tire rollers. After 20 years' experience they believe that surface treatments on good gravel bases will carry several thousand vehicles a day without excessive maintenance costs; that the low cost of surface treatments as compared with thicker tops aids in speeding up the converting of gravel roads into black tops; that further thickness can always be added economically if the bases are good. Under extreme conditions it may be necessary to retreat some roads every year or two. Adequate widths of black-top surfaces to meet traffic conditions will greatly reduce the cost of edge maintenance. For passenger car traffic, 20 ft. is adequate, but if there is much truck traffic the width should be not less than 22 ft.

Otto S. Hess—"Surface Treatments on Good Bases Wholly Satisfactory." *Better Roads*; August.

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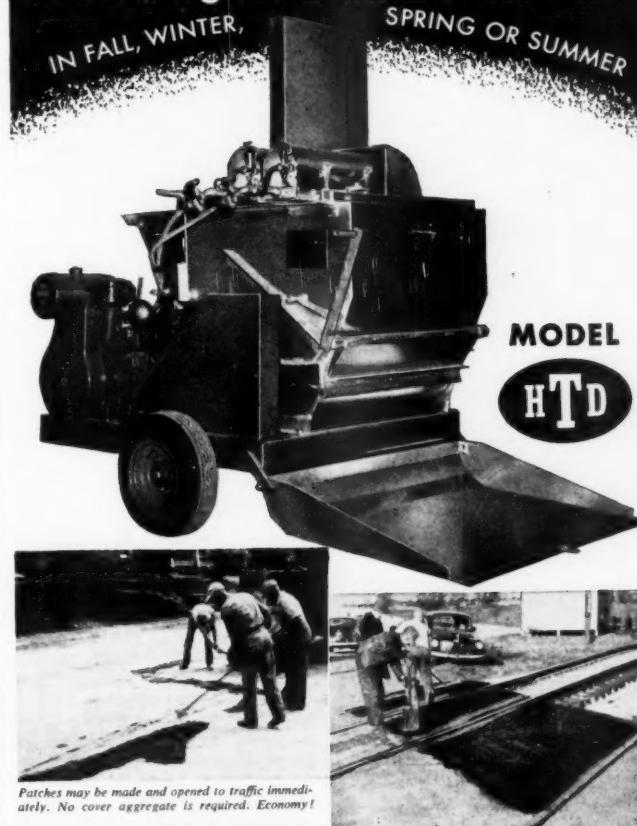
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Patching Plant

(Continued from page 73)

its position underneath the pugmill.

At the present time, we have two men on the operating crew of the Mixall. They are, of course, free to pursue other duties around the Street Department Shop, since we do not find it necessary to operate the machine constantly.

Right now we are using pit-run gravel as aggregate material. All of this passes a 3/4-inch screen, and we heat it to somewhere between 275 and 300 degrees F. before mixing. For bitumen, we are using an MC-4 and have held to a ratio of about 10 gals. of bitumen to every yard of aggregate.

As I have previously described, we stockpile this mix, since it has excellent keeping qualities and reclaim it as we need it. We have two trucks that we can use for our patching work and occasionally keep both of them and a crew of three or four men busy.

Right now, we are engaged in patching scattered pavement breaks in various parts of the city and as a result we have operated the Mixall in a central location. Later on, when we get around to some

streets where we have several blocks, all requiring maintenance, we intend to take the machine right down onto the street, towing it behind one of our trucks. I believe then that we will use an Asphalt Cement mix and will place it immediately, while it is hot. I am convinced that this will give us the most lasting patch, but, unfortunately, until we can catch up with the scattered jobs on which we are now working, we will not have an opportunity to use this system.

Also, we hope to pave a parking lot and do some other paving jobs for the city next year.

Although we have not yet entered our Winter season, I am confident that the Mixall is going to be a big help to us during the snow season. We have used mechanical snow removal machines for several years and keep our main thoroughfares pretty well cleaned even in the worst weather. This, plus the fact that we can produce maintenance material with the Mixall regardless of the atmospheric conditions, will enable us to fix a lot of little breaks during the winter months; breaks which might well become major failures by letting them wait until Spring.



Program for Eliminating Cross-Connections

A program of cross-connection inspection and control was carried on in Toledo, O., during 1951 by the Engineering Department of the Division of Water. One phase of the program was the inspection of 258 industrial and residential installations to determine if a source of supply other than City water existed. Where another source was found, steps were taken toward elimination; or if maintained, operation was under an approved condition which mechanically separated the two supplies. As a result of the 258 investigations, 45 violations were found, of which 15 were permanently removed. The others were either carried over into 1952 for final disposition or continue to exist under approved methods.

The 117 industrial investigations were made at an average cost per plant of \$22.72. The annual report, from which the above data are taken, states: "It would appear that there is considerable justification for setting up an inspection charge against those plants which

wish to continue using their private supply of water and thus require constant inspection and control."

George J. Van Dorp is Water Commissioner of Toledo and Paul Kiel is directing Engineering Department work.

• • •

Safety Training Procedures For Foremen

ONE of the main responsibilities of a foreman is to train the men working under his supervision. When some men think of training they visualize a complicated procedure with some high powered conferences, lots of books to read and various schedules to follow. However, training a crew to work safely is nothing more than good supervision. An alert foreman realizes his responsibility and sets up his training procedure in an organized way so his men know their jobs and can perform them safely.

There is one thing that is important and that is not to try to teach a new man too much at one sitting. When you put him to work there may be various duties for him to perform from time to time, but don't try to teach them to him all at once. Take his jobs up one at a time as he comes to them, and by the time you get through with him in the teaching of the primary steps of safety, he will have remembered the greater part of what you have told him, because he performed the jobs when the instructions were fresh in his mind. When a new man has been taught to do a job in a safe manner he is more than likely going to continue to do it in a safe manner.

There are four major steps in getting a man started and all have to do with good supervision.

1. Get him started. Find out what he knows about the job. Put him at ease, thereby getting him into a receptive frame of mind and interested in learning the job. Let him know that his job is important in the overall picture and is part of a smooth working organization. Get him started right and you will save yourself a lot of time later.

2. Explain the job. This is the What-When-Where-Why-How-Who part of an employee training. Take the job steps one at a time, and present them in the sequence of performance, using special emphasis on key points of the work. If you make a demonstration, be sure he is stand-

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ing in such a position that he can see all of your movements, and at the same time explain why you are doing things.

He may be confused, so be patient and answer any questions, even though they may seem silly to you. Don't give him too much at one time, and don't try to teach him any short cuts until he has mastered the whole operation. Instead, watch that he doesn't develop any supposed short cuts on his own.

3. Have him do the job. Watch him do the job. Don't get excited or impatient if he doesn't seem to

"get it," and don't stop him unless he is making some serious error. Smooth out the little wrinkles and try to get him into the swing.

As you review the job with him, explain the minor errors he has made and what he should do to correct them. Keep close tab on him until you are sure that he knows what he is doing and why.

4. Continue Supervision.—Your responsibility has not ended at this point. You must follow up; you must catch errors and bad habits of work that may develop and must correct them before they cause

PUBLIC WORKS for October, 1952

damage to himself, to his fellow workmen or to the equipment he uses. Encourage him to ask questions. "If the student hasn't learned, the teacher hasn't taught." We all learn a step at a time, too.

Don't get impatient and take over the job from him without an explanation of why you are doing it and demonstrating what you want him to see. Remember that a foreman's job is continual supervision, including teaching and correcting, even the experienced men.

The foregoing applies not only to new men but to all employees, no matter how long they have worked for you, and so long as they are assigned to a job they have not done before.

There are many jobs which in themselves are not hazardous but which could be frightfully so if handled by an inexperienced man. To maintain discipline among the workmen under your direction, show them how to do the job correctly and then follow up by insisting that it be done that way—the safe way.—The Safety Digest of the Dock Safety Association via the National Safety Council.

* * *

Preventing Wet Weather Damage to Surface Treatments

Failure of newly-laid surface treatments and surface dressings may be caused by rain during the laying period. To avoid such failures, work of this nature may be restricted to good weather periods. This results in expensive delays. The British Road Research Laboratory undertook investigations of this problem, since it is a serious one in Great Britain because unsettled weather prevails during much of the summer.

Laboratory and full-scale road experiments by the Laboratory have shown that damage due to wet weather can be prevented by applying a solution of an adhesion agent in creosote, either as a precoat to the aggregate, or by sprinkling on the binder before applying the stone. An effective agent was found to be a quaternary ammonium compound.

Pretreating the stone gave better results and required less care than the sprinkling technique. Road Note No. 14, Road Research Laboratory, gives details of application and a specification for the solution. Road Note No. 14 can be purchased from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y.

JACK AMMANN PHOTOGRAHMETRY IS HELPING OTHERS . . .



SOLVING A TRAFFIC PROBLEM IN NEW ENGLAND A crisscrossed network of roads and streets, many dating back to revolutionary days, created an aggravated traffic problem in a congested Rhode Island area. The location and design of an expressway to meet tomorrow's needs is now being met with Jack Ammann topographic maps.



RECORD-KEEPING-SYSTEM MAPS FOR INVENTORY AND PLANNING PURPOSES OF A LONG ISLAND UTILITY 5832 base maps by Jack Ammann are making the job easier for the Long Island Lighting Co. The maps were at a scale of 1"=100 ft.; 1"=200 ft.; and 1"=800 ft.



FOR DEVELOPING A STRIP MINE IN TEXAS TO SERVE ONE OF THE NATION'S LARGEST INDUSTRIES A new industry in Texas, vital to defense, is using aerial photographs and topographic maps for development and strip operations to produce lignite, which in turn is used to generate power.



PLANNING ENGINEERING OF NEWLY ANNEXED AREAS OF KANSAS CITY A year ago Kansas City turned to Jack Ammann to supply aerial photographs, mosaics and topographic maps of 25 square miles of newly annexed areas for tax, planning, engineering and zoning purposes. They have again turned to us for 8 additional square miles for the same purpose.



LOCATING AND DESIGNING AN EXPRESSWAY IN THE SOUTH'S LARGEST CITY With Houston becoming the South's largest city and America's second-ranking seaport, traffic problems developed. To meet their growing problem they turned to Jack Ammann Photogrammetric Engineers for aerial photographs and topographic maps for the location and design of an expressway.

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**PUBLIC
WORKS****DIGESTS****THE WATER WORKS DIGEST****Evaporation
From Reservoirs**

Estimates of evaporation from lakes and reservoirs are commonly based on records of evaporation from pans and empirical formulas based on only approximately nine primary determinations of evaporation from large pans. The inadequacy of these for determination of reservoir evaporation led to cooperative research by the Geological Survey, Bureaus of Reclamation, of Ships, and of Weather, and the Navy Electronics Laboratory. The tests were made at Lake Hefner, a reservoir of Oklahoma City's water supply, with an area of almost 2600 acres. The meteorological data were recorded on nearly 100,000 punched cards, and computations were made by machine. On the basis of these, a formula was developed, based on average daily wind speed and vapor pressure difference between water surface and ambient air. The coefficients for any given reservoir would be determined by field calibration for approximately one year, from which an empirical curve for that reservoir could be prepared.

Among the facts brought out by the test were that evaporation in the absence of wind is negligible; and that, since deep lakes remain relatively warm for some time in the fall, evaporation into the cool, dry air may be much more than in summer.

G. Earl Harbeck, Jr.—“Evaporation Research at Lake Hefner,” *Journal, American Water Works Ass'n*, August.

**Contamination of
Water by Joint Packing**

The authors studied the desirability for use as packing in water pipe joints, of raw jute, sterile treated jute, cotton, asbestos, Fibrex and Pakmaster. The treated jute was that furnished by the Twisted Jute Packing and Oakum Institute,

which had been treated with a solution containing organic copper and mercury compounds. Using the three-day cycle test for determining increase or decrease in bacterial numbers, they concluded that untreated jute is highly unsatisfactory; that the mercury-treated jute, except for the possible danger of mercury leaching into the water in the main, seems to be desirable in every respect, being bactericidal, as was asbestos also. Fibrex showed somewhat better values than other nongermicidal materials.

Charles A. Black and Wilson T. Calaway—“A Study of Jute and Other Yarning Materials,” *Journal, American Water Works Ass'n*, August.

**Porous Plates
For Filter Bottoms**

The use of porous plates for filter bottoms began in 1934 and there are now approximately 300 installations in plants ranging from 0.25 mgd to 40 mgd capacity. Since 1933 coarse grades of plates have been made in which the bonded granules are comparable in size to the smallest torpedo sand. At first, the plates used for filter bottoms were of special design, but since 1936 less expensive plain plates have been used, supported on concrete piers (timber piers in Sweden in 1937), structural steel and in other ways. Four patented designs are offered

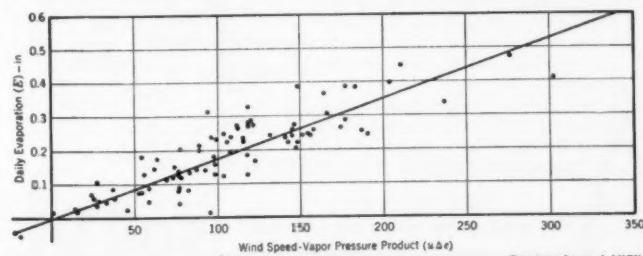
by Walker Process Equipment, Hardinge Co., American Water Works Co. and E. D. Barstow. With these plates, no gravel under the sand is needed. Three grades of porous plates are available for use with different sizes of filtering medium. These plates should not be used where after-precipitation will occur; although they can be cleaned with acid without injury to the plates.

In using these plates, they must be handled with care. The bedding and joint sealing material should be of a resilient type. Plates must have complete bearing at all support surfaces and all joints must be thoroughly sealed. Washers should have complete area contact with plates through sealing cement. Nuts should be tightened to approximately 5 lb. pressure.

Frank C. Roe—“How to Use Porous Plates for the Modern Water Filter,” *PUBLIC WORKS*, September.

**Ground Water
Recharge**

Southern California obtains more than two-thirds of its water supply from wells. Surface reservoir sites are scarce but underground basins that can be operated as reservoirs are plentiful, and recharging is employed where necessary to keep these underground reservoirs filled. Where clays or other tight materials



• DAILY evaporation and windspeed-vapor pressure product relationship Courtesy Journal AWWA

do not separate the land surface from the ground water body, recharging is accomplished by the ditch-and-furrow method or the basin method.

Where strata of impervious materials lie above the ground water, well recharge is practiced. The basin method is the most practicable for surface water spreading if suitable land for the ditch-and-furrow method is scarce or expensive. Fairly silty water may be used if basins are scraped or cultivated after each few months of operation. Costs of spreading infrequently recurrent

flood waters have not exceeded \$8 per acre-foot for installation and operation. Well recharge requires considerable research before it can be considered uniformly successful, but methods are being evolved which indicate possible success of continuous well recharge where the objectives warrant—such as repelling sea water intrusion. Sewage reclamation for ground water recharge is indicated to be thoroughly feasible if the large-scale development costs are spread over a sufficient period of time and if careful control is maintained to prevent

PUBLIC WORKS for October, 1952

pollution of ground water by deleterious influents.

Finley B. Laverty—"Ground Water Recharge;" *Journal, American Water Works Ass'n*, August.

Underground Disposal of Wastes

A task group of the Am. Water Works Ass'n, appointed to study the disposal of wastes into the ground, made a preliminary report in 1952 on the effect of such disposal upon sources of public or industrial water supply. In many states no problem exists, because of sparse population, lack of industries, heavy soil types or absence of productive aquifers. Where the problem exists, bacteriological contamination resulting from sewage disposal is the most frequently mentioned cause of objection. Among other causes, oil and gas-field waste brine is the most common. In Michigan, 75% of the public water systems are supplied by ground water from wells, many of them in porous glacial drift, and the well disposal of wastes is considered seriously objectionable. It would be even more dangerous in cavernous limestone areas. The task group recommended State rules and regulations for the control of ground water pollution.

"Control of Underground Waste Disposal;" *Journal, Am. Water Works Ass'n*, August.

Obtaining Fresh Water From Sea Water

The California State Legislature in 1951 made an appropriation to the Univ. of California for investigating the practicability of refining sea water to supplement the normal supplies in cities along the coast. The investigators believed that distillation by some method seemed more promising financially than freezing, chemical methods, membrane process, or electrolysis, because distillation can be combined with power generation, and have studied three distillation schemes—a diesel power plant with a triple-effect distiller unit; temperature difference between surface and deep sea water or between the cooling water inlet and outlet temperatures of a steam turbine; and solar distillation. In use of a diesel plant, the distiller unit would absorb the waste heat in the cylinder jackets and exhaust of the engine. The temperature-difference method would be based on the design of a plant which the French propose to con-



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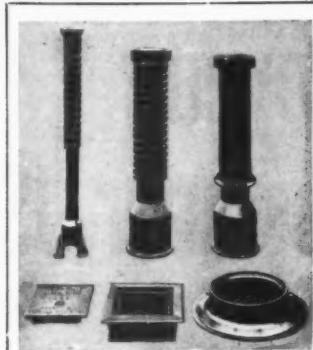
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struct on the coast of French West Africa. The solar distillation method, as it was used in Chili and in a small unit at M. I. T., consists of troughs covered with sloping plates of glass; sea water in the troughs is evaporated by the heat of sun, condensed on the under side of the glass covers down which it runs into collecting troughs. They estimate that a plant using the first process would cost \$0.50 per gpd; by the temperature - difference method, \$1.00 per gpd; and by solar distillation, \$4.00. The diesel-waste heat plant is limited in applicability and has a low output of distilled water. The temperature-difference method is still in the experimental stage; and the solar-distillation method seems the most promising.

In discussing this paper, Prof. Wilfred F. Langlier stated that chemists favor the membrane process—the use of thin porous membranes through which the movement of salt ions can be controlled by the application of electrical energy.

Everett D. Howe—"Sea Water as a Source of Fresh Water;" *Journal, American Water Works Ass'n*, August.

**Purification
By Flotation**

The author describes a flotation process for the purification of raw surface water varying in turbidity from 15 to 300 ppm. Nontoxic quaternary ammonium compounds are used in a concentration of 10 ppm and air is blown through the water, and the mud, bacteria and amebic cysts come to the top in the foam, where they can be removed by scraping or blowing off the foam. This process does not sterilize the water, but it has reduced the bacteria by 99%, and completely removed cysts of *E. histolyticus* in a concentration of 1500 per ml. The finished water is clear and sparkling, with no taste or odor. It is estimated that the cost is about 5¢ per 1,000 gal.

S. H. Hopper and Max C. McCowen—"A Flotation Process for Water Purification;" *Journal, American Water Works Ass'n*, August.

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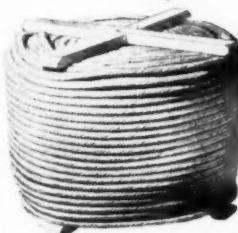
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Evaporation Research at Lake Hefner. By G. Earl Harbeck, Jr., U. S. Geological Survey. August, Pp. 701-706.

A Study of Jute and Other Yarning Materials. By Charles A. Black, Cons. Eng., and Wilson T. Calaway, Asst. Prof. Univ. of Florida. August, Pp. 707-718.

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Control of Algae and Weeds in Reservoirs. By Martin E. Fleinte, Engr., Am. W. W. Service Co. August, Pp. 727-731.

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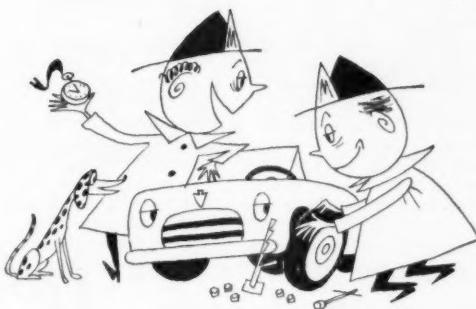
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Raleigh Water

(Continued from page 78)

al campaign carried on by Mr. Carper and others who enlisted in the cause. It should be noted in passing that Mr. Carper found that the voters showed more and more resistance to individual items on the

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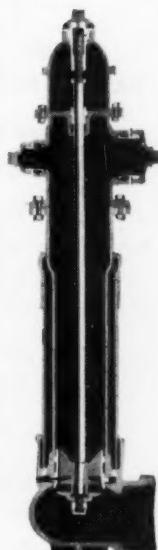
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ballot as the list got longer. In other words, bonds for sewage disposal and for the water system amassed big majorities, but by the time the voters got around to the bottom of the list and the last item—the recreational program—they were far less enthusiastic. The lesson in this? Mr. Carper points out it may be a good idea, in making up the ballot, to list the weak sisters first and end up with the items which are relatively sure to be good vote-getters.

Pointed questions had to be answered at each citizens' meeting. For instance: What is your financing plan? Answer: The projects proposed are to be paid for by borrowing money through the sale of Serial Bonds. Question: How long will the entire construction program take? Answer: Three to four years. Question: How does the City propose to pay off these bonds? Answer: Bonds will be sold as contracts are let and funds needed. An interest rate of less than 2 per cent is believed obtainable on the money borrowed. The City will pay off this loan annually over a 30-year period. Question: How much increase will each citizen have to

bear on his water bill? Answer: We estimate an increased service charge of about 36 per cent.

By the fall of 1952 the new 4-mg capacity reservoir will be complete at the water plant site. The reservoir, bowl-shaped and of reinforced concrete with a concrete top, will supplement the two existing reservoirs, one of 2 mg capacity and the other of 2.4 mg capacity. The rest of the expanded filtration plant, including 5 additional 1 mgd filters to supplement the 8 present ones, is not expected to be ready before Jan. 1, 1953. The filters will be constructed by Roberts Filter Co. Pumping capacity will be expanded to accommodate one auxiliary gasoline-operated 600-hp Morris pump with a rated capacity of 5500 gallons per minute. Place is also reserved for an additional pump to be added later, and for a set of pumps at Swift Creek.

Palmer filter sweeps will be installed by Roberts in all 13 filters. Two new chlorinators by Wallace & Tiernan are being added to the plant for a total of three, one of the new ones being a replacement. Gauges throughout are by Simplex Valve and Meter Co.

Cement Treated Base Construction in California

CALIFORNIA'S first use of cement in treating subgrades was in 1921, when it used portland cement, hydrated lime, limestone and bitumen as admixtures with adobe soil to provide a subgrade for concrete pavements. In 1923 there was no visible benefit from any of these. Examination in 1951 of the cement treated base gave the explanation—the mixing had been so poorly done that pure cement was found in thin lenses. During ensuing years a few trials were made of low-strength concrete and mixture of cement with sand and sandy silt. In 1940 traveling pugmills were substituted for the previous use of farm machinery, and standard procedures for control of cement-treated base construction by use of test specimens were worked out.

At present, cement treatment in California is used for three distinct purposes: (1) To provide an economical pavement foundation of limited slab strength greater than that of the natural material but less than that of concrete pavement.

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(2) To solidify subgrades for concrete pavement and make them resistant to displacement or to erosion.

(3) The addition of low cement contents to foundation materials to overcome high expansion qualities or to increase shearing resistance.

Determination of cement content in base mixtures is based on laboratory investigation of the materials. At first the tendency was to use too much cement, at times giving 28-day strengths as high as 2,000 to 3,000 lb. per sq. in., which led to unsightly cracking. Now a strength of 650 lb. at seven days is specified, it being found that at this strength contraction cracking ceases to be objectionable.

When aggregate is imported from an outside source, cement-treated bases are plant-mixed. Road mixing is specified for treating the material in place. Rolling must be completed within two hours after mixing, using 12-ton 3-wheel rollers. Then the surface is shaved with a blade grader to a tolerance of $\frac{3}{8}$ in. in 10 ft. and finally rolled with a pneumatic-tire roller and sealed with 0.2 gal. per sq. yd. of asphaltic emulsion. This type of subgrade treatment is found to prevent pumping; and although its cost averages \$4,500 a mile for a two-lane pavement, correction of pumping costs \$20,000 to \$50,000 per mile.

A considerable mileage of pavement foundation has been constructed with cement contents ranging from 1 to $2\frac{1}{2}\%$. With such low content thoroughness of mixing is very important. To test the uniformity of the mixture, samples are tested from both sides and the center of the mixed windrow at frequent cross-sections. The engineers believe that by this method they can successfully mix cement with fine-graded materials such as silty sands with as little of $\frac{1}{2}\%$ cement.

Says Earl Withycombe, Asst. State Highway Engineer, author of the article in *California Highways* of which the above is a condensation: "It might appear from the foregoing that California has gone all out for cement as a general cure-all. Such is certainly not the case. Cement treatment is far from being a cheap form of construction and in considering its use the benefits to be gained must be carefully weighed against the cost. The proper use of cement is filling a long-time need and very definitely has a place in highway construction and maintenance."

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Material Requirements

(Continued from page 71)

Copper and Aluminum Easier

Copper and aluminum have become much easier in recent months, in part due to betterment of the source of supply and in part due to cut-back in the need of these materials by reason of the shortage of steel. For example, manufacturers using all three metals—steel, copper, and aluminum—cannot use the copper and aluminum if they cannot get the steel. There is a possibility that copper may again become a critical item, and for this reason substitutions of other materials may become necessary. The use of plastic service pipe for water connections instead of copper tubing is receiving wide study and investigation. It is felt that further studies of the use of this material should be made by the industry. Sufficient copper has been made available for production of water meters without having to resort to cast iron meters, as used during World War II. The meter manufacturers are studying the possibility of using other substitute materials in some parts of the meters. This study in conservation is encouraged.

What About Decontrol?

There has been so much talk of the "stretch-out"—the extension of our rearmament program that many people have lost sight of the basic fact that the building of our military machine is still on the upgrade. By stretching out the program, the pitch of the incline becomes less than was first contemplated, but the movement is still upward. Increasingly great quantities of materials are going into jet engines, tanks and the other strategic armaments so necessary for defense. The peak has not been reached, and will not be reached this year.

This is the single great factor which must be held in mind when talk of decontrol is being bandied about. Irksome as controls are to many of us, they are part of the price of freedom.

I can assure the readers of Public Works, however, that the National Production Authority is not in love with controls *per se*. We are constantly studying the supply of materials and the defense demand upon that supply so that we can increase allotments whenever possible.

If an emergency requires immediate action to obtain materials, do not hesitate to contact the Water Resources Division by telephone or telegraph. It is possible for us to make emergency allotments of materials and issue DO ratings by telegraph should the occasion arise. Sufficient information should be transmitted to the Water Resources Division to enable us to determine the need and essentiality of the application. Telegraphic authorization can then be issued, which will permit the operator to obtain the material. This action must be confirmed by filing a CMP-4C application if the project requires more material than can be handled under self-certification.

The Water Resources Division was organized for the purpose of assisting the water works and sewage works operators of this country. This we have endeavored to do. We are in Washington for the purpose of helping you, so do not hesitate to call on us when we may be of assistance.

• • •

Field Water Supply

(Continued from page 69)

proaching the surface until their water levels coincide at the shore line. Therefore, ground water should be fairly close to the surface at an advanced base site and shallow wells should readily reach it.

In the problem mentioned there were some hills that leveled into a low plain extending to the sea. At the base of these hills on the sea side would be a good spot to try for wells. There is a strong possibility that springs would be found in that location. If so, they could be protected from contamination by enclosures and would probably be an excellent source of water. If no springs exist, a further possibility is that a shallow well might flow because of the favorable geological conditions at that point.

A series of well points might be driven at the base of these hills to intercept the water flowing underground to the sea. These well points would not have to be deep: perhaps a maximum of 30 feet—more likely 15 to 20. They could be connected by a common suction line to whatever pump was available. The equipment required to drive well points is a sledge hammer, a strong back and a weak mind. You ought also to have the well point, preferably a screen drive point, screwed on the end of 1½- or

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2-inch pipe. Depending on materials encountered, it is fairly common to drive these to 50 or 60 feet with the equipment described.

Each well point will yield up to 25 gallons per minute, the amount depending on several variable factors, such as the nature of the soil and the amount of artesian pressure developed. This water will be pure, and, in warm climates, will be much cooler than surface water. It will be a supply that does not contaminate easily and one which would be difficult to injure by bombing. As an additional safety factor it should be chlorinated; but as there should be low turbidity, the chlorine dosage will be effective at such a low rate that it will not be detected by taste.

In general the purity of well water depends on the nature of the soil through which it is passing and the distance it has traveled since becoming contaminated. A common method of filtration is by a sand filter, either rapid or slow. In each case the water is passed through a layer of sand whose thickness may vary at different plants from perhaps 4 to 10 feet. Such a sand layer removes a high percentage of bacteria and in a moderately contaminated supply is itself [with chlorination] a sufficient treatment to produce a safe drinking water. It is, therefore, obvious that ground water in traveling through the soil, even for a relatively short distance, is going to lose its bacteria.

This is true for a dirt or sand soil, but it is not true where the water is traveling through rock fractures. However, rock fractures are not commonly found in coastal areas and if such conditions did prevail, it would not be possible to drive a well point even with that strong back and weak mind.

The efficacy of filtration by soil can be realized when it is understood that large permanent public water supply wells in sandy soils are considered safe by the New York State Health Department if they have a minimum distance of 100 feet to a source of contamination such as a cesspool.

One final word of advice. Dam the valley if you must. After all every engineer likes to build at least one dam as a monument to his profession—and it makes a swell swimming hole. But don't expect to drink the water. Aesthetically speaking, heavily chlorinated bath water is not considered a desirable drinking water.



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easily attached to a regular Caterpillar motor grader blade. The roller guides the plow-like blade along the edge and lip of the paving while the cutting edge cuts the trench. Four grader passes are usually required initially; then the road widener produces in two passes a trench that does not require any hand cleaning or labor. The bottom is clean and level and the pavement edge clean. Full data from Caterpillar dealers or Ulrich Prod. Corp., Roanoke, Ill.

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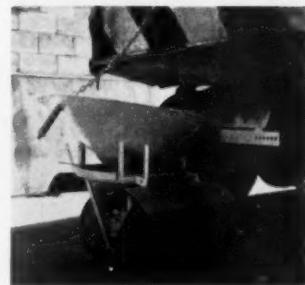
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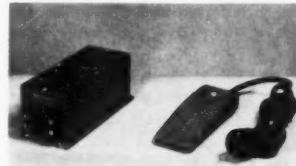
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Baughman spreader

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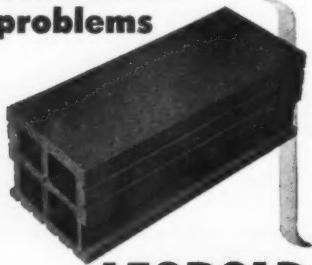


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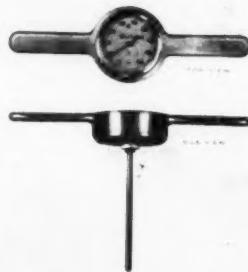
power sweeper. This automatically compensates for uneven ground and maintains a constant broom-ground pressure at all times. Other features of this sweeper include easy hydraulic controls for regulating broom angle, determining broom rotation, adjusting broom speed and setting broom height. All broom settings can be changed with stopping the tractor or leaving the tractor seat. Data from Lull Mfg. Co., 314 W. 90th St., Minneapolis 20, Minn.

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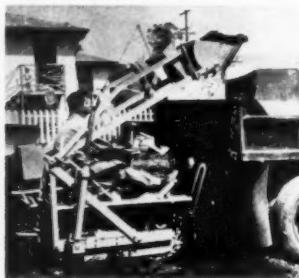


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Hydraulic High Lift Bucket for Light Earthwork

The midget-size, long-track crawler type Agricat tractor now has an hydraulically operated high lift front end bucket specially designed for it. The bucket is 5 cu. ft. capacity; the tractor is 6 ft. long, and crawler tracks are 44 ins. long. The bucket lowers to 4 ins. below track level and lifts 72 ins. For more data, write to E. H. Pence & Co., San Leandro, Calif., or use the coupon.

Use coupon on page 40; circle No. 10-9



Midget front-end loader

Tractor-Mounted Stone Spreader of Large Capacity

With a spreading capacity up to 20 tons per minute, this tractor-mounted spreader can handle stone of any size from $\frac{3}{4}$ -inch up through the normal macadam range, and also certain subgrade materials. It can spread at desired depths from 1 inch minimum up to 12 ins. Adjustable bleeder gates allow a variable width of spread from 10 ft. to 13 ft. 3 ins. in 3-inch increments. Designed for the heavier type tractors, it is mounted on the push



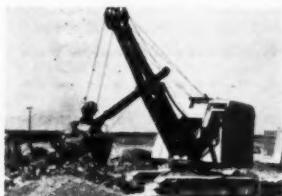
Jersey stone spreader

beams of the dozer after the blade is removed. Data from Tractor Spreader Co., Hasbrouck Heights, N. J.

Use coupon on page 40; circle No. 10-10

**Three-Quarter Yard Excavator
and 20-Ton Crane**

Completely convertible in the field to shovel, crane, dragline, clamshell, trenchhoe or pile driver,



Truck mounted crane

this new Gar Wood "75" also has a foundation borer. This new attachment combines belling and boring in one operation and permits the use of faster unreinforced footings. This is also available as a 20-ton truck crane mounted on 6 x 6 or 6 x 4 chassis. However, as an excavator, mounting is on crawlers. Operation is by direct manual controls. Data from Findlay Div., Gar Wood Industries, Inc., Findlay, O.

Use coupon on page 40; circle No. 10-11

• • •

**Mobile Electrical Repair Shop
for Evanston**

Completely equipped, from light bulbs to ladders, an International motor truck with a Truck Engineering Co. body services electrical



IHC special body truck

equipment for Evanston, Ill. It maintains traffic signals, fire alarms and electrical equipment. Small parts are stored in special compartments, both vertical and horizontal, which are readily accessible. Two electricians operate it. More from International Harvester Co., Chicago, Ill.

Use coupon on page 40; circle No. 10-12

**more
batches
per
day
with**



Jaeger "Speedline" Mixers

Seconds saved at both ends of every mixing cycle add up to more batches per day for Jaeger owners. Famous "Skip Shaker" loader speeds the batch into the drum in 5 to 7 seconds. Batch discharge is just as fast because bigger bucket and flight blades carry more concrete to discharge spoon. Free from break-down over many years: machined steel drum tracks, Timken bearing carwheel-type drum rollers, heavy-duty automotive transmission. Sizes 6, 11 and 16S. Ask for Catalog M-10.



3½ S Auto-Loader loads while a batch is mixing, then automatically shakes load into drum. Produces 12 to 15 more yards daily.

THE JAEGER MACHINE COMPANY

Distributors in 153 Cities in the U. S. and Canada

PUMPS • COMPRESSORS • HOISTS • TOWERS • PAVING EQUIPMENT

400 Dublin Ave.
Columbus 16, Ohio



**WHERE
ELECTRICITY
MUST NOT
FAIL!**

**ONAN Emergency Electric Plants
Assure Light and Power!**

POLICE RADIO TRANSMITTERS, fire department signal systems and many divisions of the civil defense corps rely on Onan Electric Plants for emergency electricity. When power fails, Onan plants start automatically, supply current for all essential uses, stop when power is restored.

Onan Electric Plants are an important part of a city's defense against disasters of many kinds. Write for folder!



A SIZE FOR EVERY NEED
GASOLINE-DRIVEN—Air-cooled:
1,000 to 3,500 watts A.C. Water-
cooled: 5,000 to 35,000 watts A.C.



D. W. ONAN & SONS INC.

7662 University Avenue S.E.

Minneapolis 14, Minnesota

Get full details of this month's new products . . . mail your Readers' Service card today.

WANTED—DIRECTOR OF PUBLIC WORKS

Applications will be received at the office of the City Manager, City Hall, Tucson, Arizona, until 4:00 p.m., October 15, 1952, for the position of Director of Public Works of the City of Tucson.

Applicants must be graduates of a recognized college or university with specialized training in civil engineering or a related field and have had a minimum of five years successful experience in public works administration. Probable salary range \$650 to \$760 per month.

FOR SALE

2 Weiman CENTRIFUGAL PUMPS direct connected to 7½ H. P. 220-440 Volt 3 ph. 60 Cy. motors 1150 RPM. Ball Bearings. 4' Outlet pipe. \$250 each

C. B. STRAYER

148 N. West St.
Carlisle, Pa.

City Superintendent wanted for small southwestern Missouri city, to supervise electric distribution and generation, streets, water system, and disposal system. Submit resume stating education, experience, age, and availability. Salary open. Write Box 10-1 care Public Works Magazine.

FOR SALE

Electric Motors
2 HP to 500 HP
Transformers
2 KVA to 1000 KVA
1 lot of Screen cloth, various mesh; 1 Sand Dryer, 43" dia x 14', 1½ tons per hour; 1 Grace Double Drum Sheep Foot Tamping Roller; 1-5 Ton Bridge Crane, 20 Foot Span, electric hoist.... Other items: Pumps, Electrical Line Hardware, Acetylene Generator.

**MOUNT MORRIS
DAM BUILDERS**

Box 25 Mount Morris, N.Y.
Phone 298

New Radiation Detector has Wide Measurement Range

For maximum usefulness in civil defense, this new radiation detector is designed to measure from 0.02



Jordan radiation detector

R hr. to 500 R/hr. on an easy-to-read, single logarithmic scale. It is powered by only 4½ volts, without the need for amplification. It measures only 5 ins. by 3 ins. by 3 ins. in size and weighs only 2 pounds. It has a performance record of 168 hours of continuous use with no drop in meter reading. Accuracy is within 10%. Jordan Electronic Mfg. Co., Inc., 9042 Culver Blvd., Culver City, Calif.

Use coupon on page 40; circle No. 10-13

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Aluminum Gratings Resist Corrosion and Weigh Less

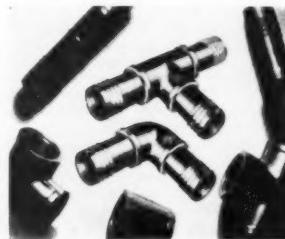
For sewage treatment plants, water treatment works, industrial waste installations and many similar installations, aluminum gratings have many advantages. Also they are non-sparking. Gratings installed 12 years ago in a sewage treatment plant are as bright and clean as they ever were and have required no maintenance. Full data on every type of grating from Borden Metal Products Co., Box 172, Elizabeth, N. J.

Use coupon on page 40; circle No. 10-14

• • •

New Fittings for Plastic Pipe Lines

New insert type ell and tee couplings to facilitate making sharp



Fittings for plastic pipe

PUBLIC WORKS for October, 1952

turns or takeoffs from flexible plastic pipe lines have been announced by Carlon. The only tools required are a saw and screwdriver, stainless steel clamps being used for making the connections. Fittings are molded from a single piece of material. Data from Carlon Products Corp., 10225 Meech Ave., Cleveland 5, Ohio.

Use coupon on page 40; circle No. 10-15

• • •

Slip-On Fittings for Permanent and Temporary Pipe Structures

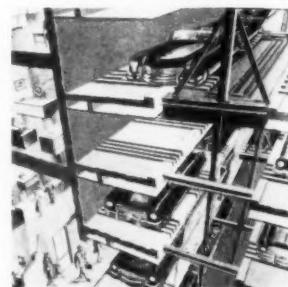
These slip-on fittings are claimed to save as much as 80 per cent on labor and 30 per cent on overall cost as compared to conventional threaded pipe and fittings. Made of corrosion resistant aluminum alloy, they are available from ¾-inch through 2 ins. in five basic fittings to meet all needs. Bulletin 116 gives specifications, dimensions and much other data. Hollaender Mfg. Co., 3841 Spring Grove Ave., Cincinnati 23, O.

Use coupon on page 40; circle No. 10-16

• • •

600 Cars Can Be Parked on a 6,000-Sq. Ft. Lot

With this device, it is claimed that 600 automobiles can be parked on 6,000 sq. ft.; that 2 or 3 men can



Handles many cars

run such a parking garage; and that 12 cars a minute can be parked and/or unparked. Estimated cost of a 200-car unit is \$1,300 per car. Full scale model in Houston, Tex., has handled 250,000 cars efficiently. More data from Charles Crosson & Co., 3803 S. Main, Houston 2, Tex.

Use coupon on page 40; circle No. 10-17

• • •

Short-Haul Microwave Radio for Utility Work

This compact microwave radio operates in the frequency range

of 940 to 960 megacycles. With relay equipment, it can be used for distances to 300 miles, with repeater stations about 75 miles apart. It is especially useful for pipeline, utility, highway and police use. It provides for simultaneous operation of five voice and one service channel. Fuller technical information from RCA Victor, Camden, N. J.

Use coupon on page 40; circle No. 10-18

• • •

Early Release From Service of Certain Reserve Officers

A Department of Defense information sheet, dated Sept. 3, outlined information regarding the above matter. We have been trying to get more precise information regarding the effect that this newly announced policy will have in respect to sanitary and other engineers. The information we have received is not entirely consistent, but it appears that "technical specialists, such as engineers [of the Medical Service Corps] will not be granted early release."

It appears that engineers on duty with the Corps of Engineers will generally be released in accordance with the accelerated program.

The accelerated program, in brief, is: Officers who served at least one year during World War II will, if now serving overseas, be en route to the US by 30 Nov.; if serving in the US, they will be released no later than 30 Nov. Officers who served less than one year during the war will be released not later than 31 March 1953, whether or not they have completed 19 months of service by that date.

In any case, those to be released must be serving involuntarily and must desire early release. Those officers who are due for release prior to the above dates will not be affected.

• • •

Special Civil Defense Rescue Service Trucks

An initial order for 55 specially equipped Civil Defense rescue service trucks has been received by Reo Motors. These will be delivered to specific CD units and each truck will serve for the standard training of rescue personnel under pre-attack conditions, and as a base of operations in event of need. Bodies are all steel and will carry 99 separate items of tools and

equipment, varying from small hand tools to power equipment, such as generators and power saws. Each tool is compartmented and grouped according to the job required of it. Also, each truck will have room for two stretcher casualties. A crew of 8 men will be carried.

• • •

Austin Awards Contract for 25 MGD Water Plant

Bids for the construction of a 25 mgd water treatment plant and a high service pump station for Austin, Texas, have been received and the contract has been awarded to Rex D. Kitchens Construction Co. of Austin.

We have been informed by A. H. Ullrich, Sup't. of Water and Sewage Treatment, that the Kitchen contract does not include the purchase of high or low service pumps; the purchase of pump starters, controls and gears; the equipment for electric substations; the lake intake; nor the raw water line from the intake to the plant. The total cost of the first phase of the project will probably be between \$2,500,000 and \$3,000,000. This first phase will cover everything needed for a 25 mgd

Slash Digging Costs!

The Amazing

HENRY BACKHOE

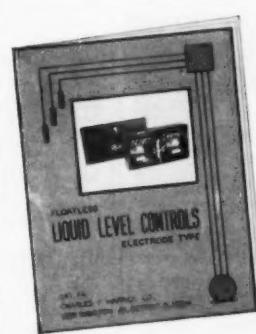
You can slash your digging costs fast, accurate, sturdy Henry Backhoe. It's built to TAKE it. Does an amazing job. Very flexible. Ideal for lateral, footings, septic tanks, graves and EVERY digging operation. Maximum reach 11 feet. Has powerful double acting hydraulic cylinders. Perfect operator control. Two models -B-B and B-A-B. Several width buckets can be furnished. Full swing of 160 degrees. A complete unit. Is quickly attached to your tractor. If you want to simplify EVERY digging job, SLASH costs and get more SPEED, get a Henry Backhoe—NOW. See your dealer or write direct.



HENRY HYDRAULIC all purpose EARTH MOVERS
MANUFACTURING COMPANY, INC.

BACKHOES • TERRACERS • SCRAPERS • BULLDOZERS
1756 No. Clay St. . . Topeka, Kansas

Now's the time to mail this month's Readers' Service card.



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Catalog**

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Representative
Wanted**

- Pump Controls
- Duplex Pump Alternators
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- High and Low Level Alarms
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CHARLES F. WARRICK CO.

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Berkley, Mich.

Warrick

**FLOATLESS
LIQUID LEVEL CONTROLS
ELECTRODE TYPE**

STREET, SEWER AND WATER CASTINGS



Various Styles, Sizes
and Weights
Manhole Covers and Steps
Adjustable Curb Intlets
Water Meter Covers
Cistern and Coal
Hole Covers
Gutter Crossing Plates
Valve and Lamphole Covers

Write for Catalog and Prices
SOUTH BEND FOUNDRY CO.
Gray Iron and Semi-Steel Castings
SOUTH BEND 23, INDIANA

WANTED AGENTS — DEALERS —

The Precision Machine Co., nationally known manufacturers of small chemical feed pumps has a few sales areas open both in the United States and foreign countries.

Our pumps are electrically operated, positive displacement, diaphragm and piston type units, designed to pump water-treatment chemicals. They are used mostly for chlorinating drinking water, swimming pools and sewage, and in the fluoridation of water, in boiler feed treatment, and many industrial processes.

For further information please contact the

PRECISION MACHINE CO.
5 Union Square
Somerville, Mass.

STOP WATER SEEPAGE SEWAGE CORROSION

WITH FORMULA No. 640

a clear liquid penetrating (1") sealer for concrete and masonry preventing water absorption and reducing the action of acids. Holds 12' hydrostatic head. Use our Haynes Rubberized Enamel for color on walls and floors—not affected by concentrated acids, alcohol, oil, or traffic abrasion.

30 OTHER PRODUCTS

Write for technical data.

Haynes Products Co., Omaha 3, Nebr.
See our file in Sweet's

DARLEY PORTABLE PUMPS

Powered by Briggs and Stratton gasoline engines. Automatic Primer. Centrifugals will handle without injury, water with sand, dirt and gravel, sand.

Model No. 11AE—Weight 61 lbs. Capacity up to 70 gallons per minute. Pressures up to 60 lbs.
Model No. 5AK—Weight 121 lbs. Capacity up to 180 gallons per minute. Pressures up to 60 lbs.
Model No. BAR—Weight 171 lbs. Capacity up to 250 gallons per minute. Pressures up to 50 lbs.

W. S. Darley & Co., Chicago 12.
Write for 48-Page Municipal Supply Catalog

INDEX OF ADVERTISEMENTS

Aero Pipe Cleaning Contractors, Inc.	114	Holmes Co., Ernest	57
Albrecht Pipe Co.	134	Homelite Corp.	27
Albright & Frel, Inc.	136	Hooper, William T.	138
Allis-Chalmers	36 & 37	Hotpoint, Inc.	34
Allman Photogrammetric Engrs, Jack	128	Hough Co., Frank G.	45
Alvord, Burdick & Howson	136	Hydraulic Development Corp.	132
Aqua Survey & Instrument Co.	54	Huber Mfg. Co.	2
Armed Drainage & Metal Prod.	113		
Auburn Machine Works, Inc.	94		
Austin-Western Co.	41	Infine, Inc.	96
Ayer-McCormick-Reagan Clay Co.	28, 29 & 66	Industrial Materials Co.	28, 29 & 51
Baker, Jr., Michael	136	International Harvester Co.	4
Baldwin-Lima-Hamilton	58	International Salt Co.	10 & 11
Bannister Engineering Co.	136	Irving Subway Grating Co.	145
Barber-Greene Co.	136		
Bauer & Schaefer	136	Jaeger Machine Co.	141
Be Ge Mfg. Co.	48	John Manville Co.	14 & 15
Black & Veatch	136	Jones, Henry & Williams	138
Blackburn Smith Mfg. Co.	117		
Bogert Assoc., Clinton L.	136	Kennedy, Clyde C., Co.	138
Bowe, Albertson Assoc.	136	Kennedy Valve Mfg. Co.	20
Bowser Corp.	28 & 29	Knowles, Inc., Morris	138
Brown, Stratton Corp.	32	Koebring Co.	124
Brown Engineering Co.	136	Kolman Mfg. Co.	94
Brown, Francis L.	136	Komline-Sanderson Engrg. Co.	100
Buck, Seifert & Jost	136	Koppers Co., Int'l.	64
Bucyrus-Erie Co.	31		
Buffalo Pipe & Foundry Corp.	122	Lake Shore Markers	106
Bullock Bros. Co.	26	Lakeside Engineering Corp.	126
Builders Providence, Inc.	11u	Leopold Co., Inc., F. B.	140
Burgess & Nipple	136	Lewis Harold M.	138
Burns & McDonnell Engr. Co.	136	Link Belt Co.	93
B/W Controller Corp.	121	Littleford Bros., Inc.	112
Caird, James M.	136	Lock Joint Pipe Co.	147
Calogen, Inc.	18	Lozier & Co., Wm. S.	138
Caron Dresser & McKee	136		
Capital Engineering Corp.	137	McConaughay, K. E.	125
Carter Sales, R. B.	42	McDonald Mfg. Co., A. Y.	103
Cast Iron Pipe Research Assn.	8 & 9	M. & H. Valve & Fittings Co.	98
Caterpillar Tractor Co.	13 & 49	McWane Cast Iron Pipe Co.	122
Centriflame Corp.	11	Metcalfe & Eddy	138
Chapman, Inc.	120		
Chester Engineers	137	National Clay Pipe Mfrs., Inc.	47
Chicago Pump Co.	3	National Fireproofing Corp.	43
Clark-Wilcox Co.	124	National Surety Corp.	22
Classified Ads	142	Natural Rubber Bureau	6
Cleveland Trencher Co.	104	Norton Company	
Colt & Son, Inc.	137		
Common-Union-Energy Superheater, Inc.	63	Oliver Corp.	33
Concrete Pipe Machine Co.	52	Onan & Sons, D. W.	141
Consoer, Townsend & Assoc.	137		
Continental Steel Corp.	106	Pacific Flush Tank Co.	99
Cook-Bessamer Corp.	131	Pacific States Cast Iron Pipe Co.	122
Corson, Oscar	137	Palmer & Baker, Inc.	138
Darley & Co., W. S.	144	Palmer Filter Equipment Corp.	134
Davey Compressor Co.	18	Phelps Dodge Refining Corp.	108
DeLeuw, Cather & Co.	21	Phelps, Inc., Boyd E.	138
Dempster Brothers, Inc.	21	Platz, Englehart & Malcolm	138
Detectoron Co.	132	Pitometer Company	138
Dickey, Clay Mfg. Co., W. S.	28 & 29	Pomona Terra-Cotta Co.	28 & 29
Dixie Co.	29	Preload Co.	138
Dow, A. W., Inc.	137	Public Works Magazine	110 & 122
Dresser Industries Inc.	35		
(See Roots-Converssill Blower Corp.)		Quinn Wire & Iron Works	122
(See Dresser Mfg. Division)		"Quick-Way" Truck Shovel Co.	65
Dresser Mfg. Division			
Empire Development Corp.	120	Remington Rand, Inc.	97
Fairbanks-Morse & Co.	23	Ridge Tool Co.	56
Federal Enterprises, Inc.	105	Robert & Co.	137
Fisher Research Lab., Inc.	122	Robert & Filter Mfg. Co.	119
Flink Company	146	Rockwell Co., W. S.	119
Flexible Sewer-Rod Equipment Co.	146	Roots-Converssill Blower Corp.	95
Food Process Co.	18	Russell & Axon, Cons. Engrs.	138
Ford Meter Box Co.	30		
Frink Sno-Plows, Inc.	46	Shunk Mfg. Co.	140
		Simplex Valve & Meter Co.	24
		Skinner Co., M. B.	54
		Smith & Gillespie	138
		South Bend Foundry Co.	144
		Stanley Engineering Co.	138
		Stillson Assoc., Alden E.	138
Gannett, Fleming Corddry & Carpenter, Inc.	137	Tarrant Mfg. Co.	127
Gar Wood Industries	137	Texas Vitrified Pipe Co.	28, 29 & 39
General American Transportation Corp.	60	Traction Co.	25
Gilbert, George	137	Tricoline Filter Floor Institute	28 & 29
Gilbert Associates, Inc.	137	Tri Line Co.	50
Gladhill Road Machinery Co.	106		
Greeley & Hanson	137	U. S. Pipe & Foundry Co.	109
Green Co., Howard R.	137		
Hagan Corp.	18	Velsicol Corp.	53
Harts Co., John J.	137		
Hosie & Green Engrg. Co.	137	Wallace & Tieman Co., Inc.	Back Cover & 61
Havens & Emerson	137	Warrick Co., Chas. F.	143
Hays Process Co.	117	Westinghouse Electric Corp.	135
Haynes Products Co.	117	White Co., David	108
Heller Co., Inc.	119	White Motor Co.	55
Helling Inc.	16	Wolfe Co., Pipe Division	101
Heltzel Steel Form & Iron Co.	143	Wood Co., R. D.	133
Henry Mfg. Co., Inc.	127	Worthington Pump & Machinery Corp.	12 & 19
Highway Equipment Co.	127		
Hill & Hill	127		
Hoffco, Inc.	127	Yardley Plastics Co.	62

plant, with major structures designed to accommodate additional equipment so that the plant can be expanded readily to 50 mgd. Also, the layout is such that further expansion to 100 mgd is possible with a minimum of cost due to changes. The unit design employed permits adding future units as needed.

• • •

Well-Trained Young Engineer Available

An engineer is available who is now in the Navy but will be released from active duty about Dec. 10. He spent 3 years in the Seabees, 1942-45 and was recalled to active duty in Sept., 1951. He is 28 years old; has BS, MS and PhD degrees from Cornell. Has had principal ex-

perience in soils engineering, but also in drainage and construction work. Write August D. Pistilli, care of this magazine. Letters will be forwarded without acknowledgment.

• • •

Norfolk Honors Sol Ellenson for 25-Year Service

Sol Ellenson, Newport News, Va., Director of Public Works, has completed 25 years of service with the city and has been honored with a 25-year pin and an inscribed certificate. Mr. Ellenson was appointed Director of Public Works in 1948, the first full-time director. He is widely known in the public works field and is a Director of the American Public Works Association as well as a member of many other organizations.

"Beachcomber" Truck Helps Clear Kelp from Beach



KELP, trash and debris are deposited on the Los Angeles County beaches and must be removed regularly. One problem has been that soft, high-piled sand make the use of conventional trucks difficult or impossible. It was necessary to design a truck not on the basis of traction, but on the basis of flotation. Col. L. L. Beardslee of the County's Department of Shops and Garages and Barney Follett of the International Harvester Co. worked out a design for this problem. The front wheels are specially dished so they will track with the rear wheels; and the rear wheels are equipped with "sand special" 8-ply 14.00 x 20 tires.

The truck is 6-cylinder 100-hp.

An IHC tractor, alternately using a skip loader and pulling a screener, picks up the kelp, trash and debris and loads it into the truck. The special truck can haul 3,000 pounds of kelp at 5 mph in loose, fluffy sand piled to a depth of 14 ins. The truck is equipped with an air compressor and tank. Tire pressures are reduced for loaded operation in the sand, then increased by means of the compressor for travel over conventional road surfaces.

Others who worked in the solution of this problem were Clifford A. Sundgren, of the Department of Parks & Recreation; S. J. Thomas, Chief of Maintenance; and P. B. Hatus, ass't. Sup't. of Maintenance, all of the county.

WALK...

DRY!

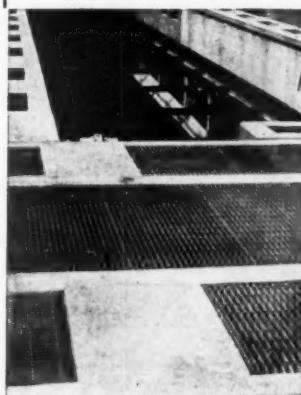
SAFE!

CLEAN!

ON

IRVING
"DRYWAY"
GRATING

**WALKWAYS and
STAIR TREADS**



IRVING GRATING

Provides the perfect Dry, Clean, Safe flooring for Sewerage disposal Plants. Gratings of Aluminum, Steel and other alloys offer a minimum of Maintenance Cost.

Catalog Mailed on Request.

IRVING SUBWAY GRATING CO., INC.

ESTABLISHED 1902

OFFICE and PLANTS at
5053 27th St., Long Island City 1, N. Y.
1853 10th St., Oakland 20, California

**BEFORE YOU BUY
SPREADERS
for Sand, Cinders,
Salt or Aggregates
FIND OUT WHY—**



**FLINK
SPREADERS**

Over 5000 Are in Use by Hundreds of City, County and State Highway Departments, Contractors, and Transit Companies

The Flink "POWER-MATIC"—Model HD41 (shown above)—is ideal for ice control, dust control, road building and maintenance. Fits all dump trucks as a replacement tail gate. Does not limit use of truck to spreading. Spreads full or half width, forward or backward. Safe to use in traffic. Controls from cab. Hydraulic or chain-drive models available. Flink's better control, and faster spreading with less waste of material are the results of 14 years of building and developing automatic spreaders.

Model SS

**FLINK
"Pull-Type"
SPREADERS**

A new improved Spreader for sand, cinders and all other granular materials used for ice or dust control and seal coating. Large hopper for easy charging. Widely used by military airports.

*Write for Literature and the Name
of Your Nearest Distributor*

**THE
Flink co.**
Dept. 1300
STREATOR, ILLINOIS

Worth Telling

by Arthur K. Akers



★ **FURTHER SIGNALING** the sublimation of our "stuffed shirt" side (and picture), we appear under a new portrait this month. It reflects, too, the fine fellowship at the New England Water Works meeting in Groton, Conn., last month—and the genial influence of our table companions, SIGWORTH and CUNNINGHAM of INDUSTRIAL CHEMICAL SALES: Nuchar taste-and-odor-control to you.

★ **ROBERT G. SCOTT**, long chief engineer of the CLAY PRODUCTS ASSOCIATION, has been appointed its vice president and general manager.



Mr. Scott



Mr. Dixon

★ **L. A. DIXON, Jr.** is new vice president heading ROCKWELL MANUFACTURING COMPANY'S meter and valve division, Pittsburgh to coordinate manufacturing and sales.

★ **The NATURAL RUBBER BUREAU**, Washington, has again expanded its rubber consultation program and laboratory facilities, to include other major uses of natural rubber powder than highway.

★ **SYNTRON COMPANY**, Homer City, Pa., is opening new stores where its power tools will be rented and sold. Newark N. J., (Route 17 and Henry Street, Hasbrouck Heights) and Chicago (236 N. Crawford Ave.) are the latest. Also a new factory in Stoney Creek, Ont.

★ **W. A. FINN** named assistant general sales manager, WORTHINGTON CORPORATION, Harrison, N. J.

★ **E. H. FISHER**, late of the recently acquired A. B. Farquhar division of The OLIVER CORPORATION, Chi-

cago, is now director of marketing for Oliver, J. O. CUNNINGHAM advertising manager.

★ **LESTER L. GROOMS** is sales manager, products engineering division, The JEFFREY MANUFACTURING COMPANY, Columbus, Ohio; vice C. W. HAWLEY promoted.

★ **JOSEPH F. HEIL Jr.** of The HEIL COMPANY, Milwaukee, is now special sales representative. He is a third generation representative in the company, founded by his grandfather.

★ **W. A. RIDDELL COMPANY**, Bucyrus, Ohio, names the Municipal Machinery Co., Coram, N. Y., as sales and service agency on Long Island.

★ **S. L. FRY** is upped from Omaha branch manager, Diesel department, for FAIRBANKS, MORSE & CO. to assistant manager, pump sales division, Chicago.

★ **WOLVERINE TUBE DIVISION** has opened a new mill depot at 1500 South Western Ave., Chicago, under E. J. CAMPBELL, midwestern district sales manager.

★ **EDSON K. GREEN** and **MYRON L. HYMAN** are new INTERNATIONAL SALT COMPANY vice-presidents. Mr. Hyman, who remains in Buffalo, has been general manager of sales there for the northern division and Canada.

THE YEARS GO BY like months, and now here is **FRED STUART'S son, FRED Junior**, joining the **STUART CORPORATION** in Baltimore as chemical engineer. But if he is the chip off the old block we think he will be selling Stuart Walking Beam Flocculators at the drop of a hat—anybody's hat—too.



Mr. Stuart

★ **SIGN** in a machine shop: "Girls, if your sweater is too large for you, look out for the machines; but if you are too large for the sweater, look out for the machinists."



FROM THE CANADIAN BORDER TO THE GULF OF MEXICO... from the Rockies to Lake Michigan, the Ohio and Mississippi Rivers... this is the broad sweep of the Great Plains served by Lock Joint's permanent pipe manufacturing plant at Turner, Kansas. Specializing in Lock Joint Prestressed Concrete Cylinder Pipe in diameters from 16" to 48", designed for any pressure common to water works practice, the Turner plant also answers demands for this type of pipe in the Great Lakes area.

...LOCK JOINT CONCRETE PRESSURE PIPE is readily available east of the Mississippi from the Company's three other permanent plants in Wharton, N. J.; Detroit, Mich., and Columbia, S. C. Together these four strategically located plants are equipped to handle any contract, however large or small, and offer the ultimate in modern Concrete Pressure Pipe in a variety of standard diameters.

SCOPE OF SERVICES—Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply and Distribution Mains 16" in diameter or larger, as well as Concrete Pipes of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous Lines.

LOCK JOINT PIPE COMPANY

Established 1905

P. O. Box 269, East Orange, N. J.

PRESSURE PIPE PLANTS: Wharton, N. J., Turner, Kan., Detroit, Mich., Columbia, S. C.

BRANCH OFFICES: Casper, Wyo. • Cheyenne, Wyo. • Denver, Col. • Kansas City, Mo. • Valley Park, Mo. • Chicago, Ill. • Rock Island, Ill. • Wichita, Kan. • Kenilworth, N. J. • Hartford, Conn. • Tucumcari, N. Mex. • Oklahoma City, Okla. • Tulsa, Okla. • Beloit, Wis. • Hato Rey, P. R. • Caracas, Venezuela

LOCK JOINT
Reinforced Concrete
PRESSURE PIPE

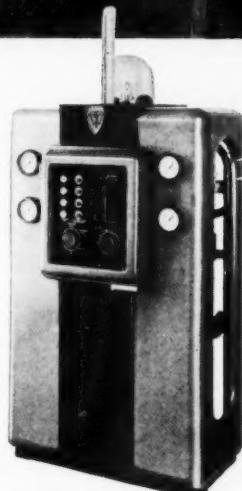


Expansion of an existing sewage plant, needed to meet the demands of increased population and industrial growth, may necessarily be delayed by current material shortages and building restrictions. In such a case, W&T Chlorinators can temporarily help carry the load by improving the efficiency of your present plant.

For example, overall plant efficiency can be increased when chlorine is applied ahead of and in the plant. Prechlorination ensures fresh sewage, giving better sedimentation. Plant

chlorination aids grease removal, prevents filter ponding and minimizes sludge bulking. Disinfection of the effluent is ensured by post-chlorination—especially important where full treatment facilities are limited.

These are practical reasons why more and more communities are using W&T Chlorinators both to temporarily increase plant capacity and to ensure better operation of a future, expanded plant.



W&T Program Control Visible
Vacuum Sewage Chlorinator

WALLACE & TIERNAN

COMPANY, INC.

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